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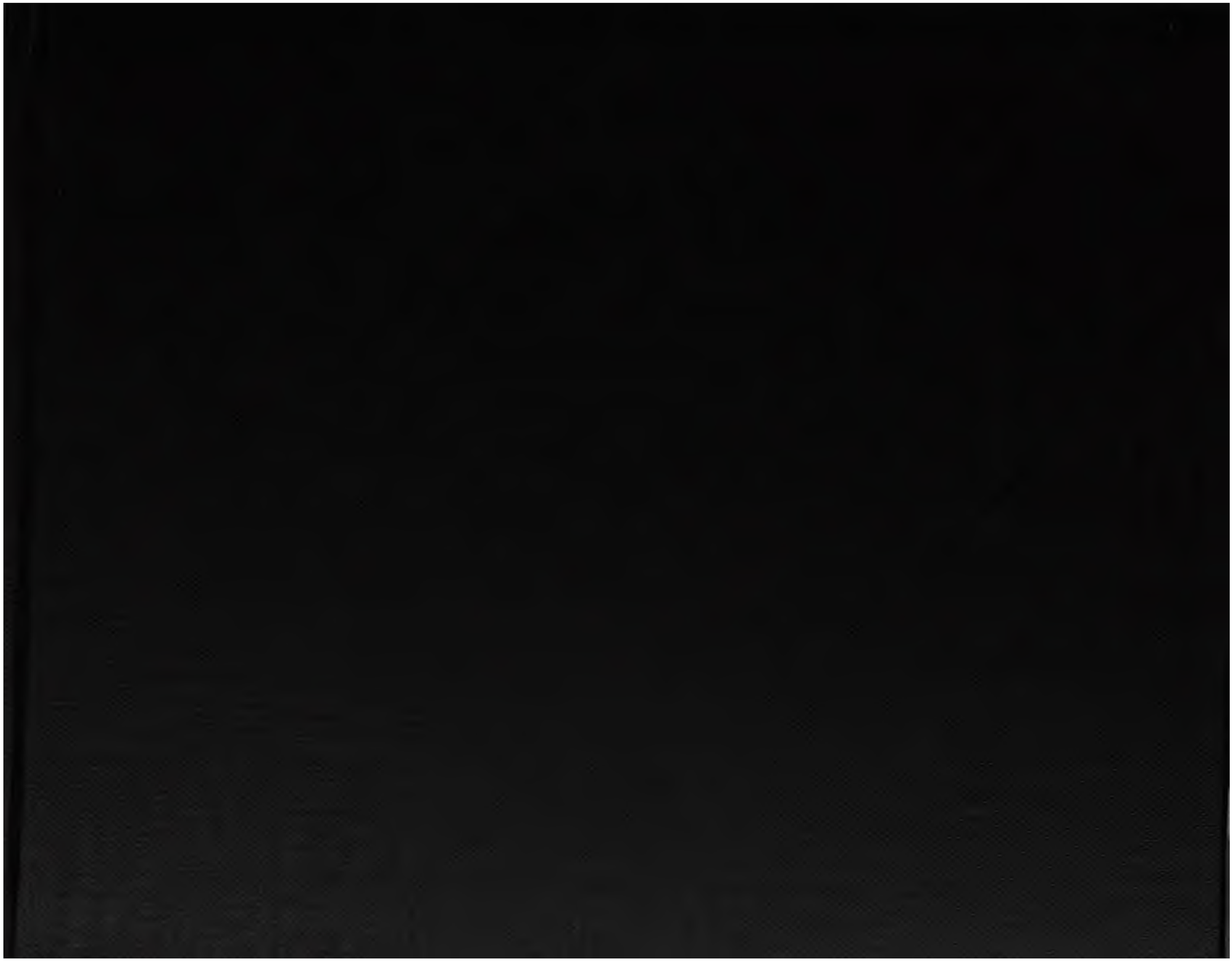

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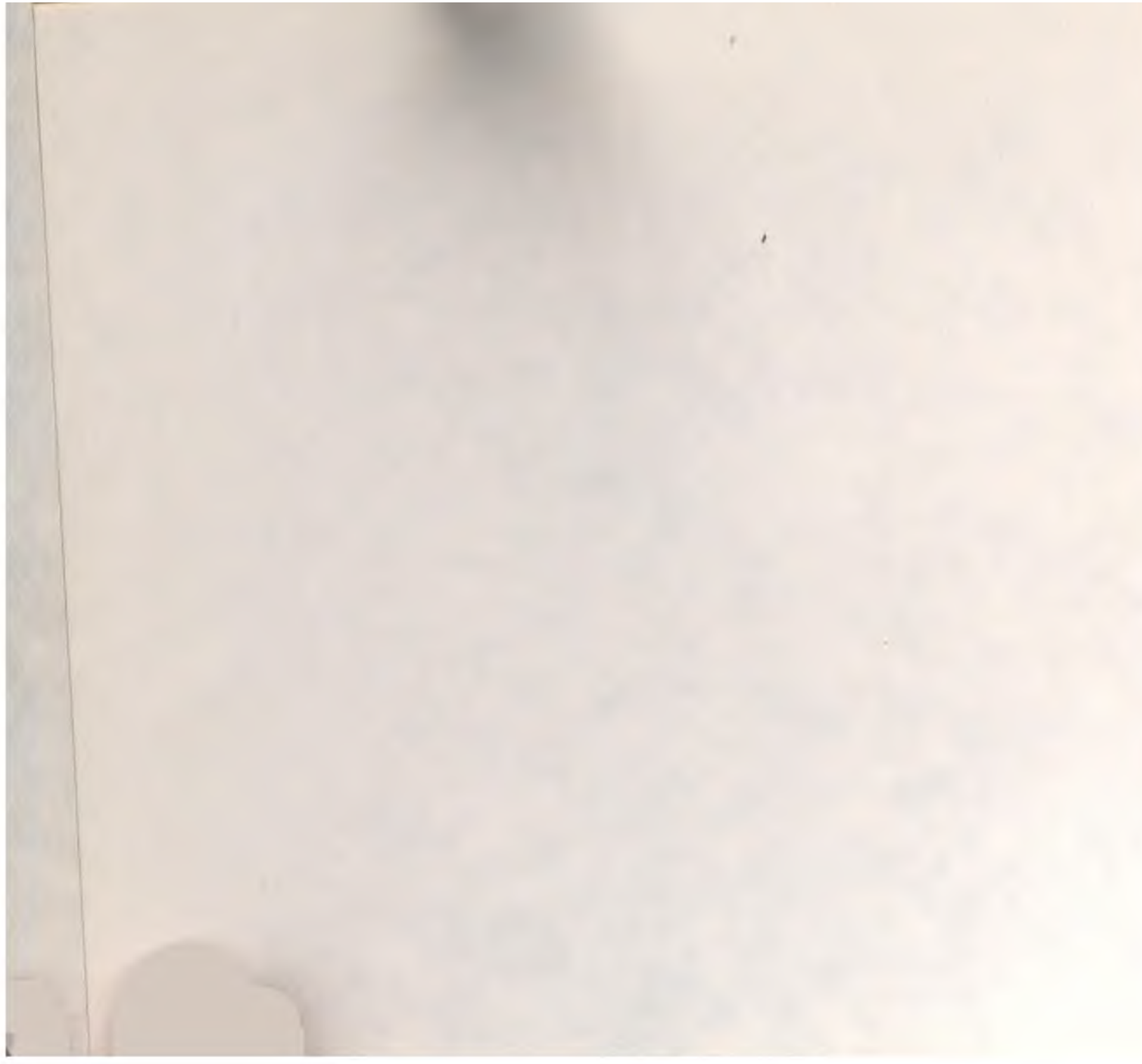

THE BALDWIN HOTEL, BEACH HAVEN, NEW JERSEY.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

JOHN A. WILSON,
CIVIL ENGINEER.

JOSEPH M. WILSON,
CIVIL ENGINEER AND ARCHITECT.

FRED. G. THORN,
ARCHITECT.

CATALOGUE OF WORK EXECUTED

ACCOMPANIED BY ILLUSTRATIONS.

WILSON BROTHERS & CO.,

CIVIL ENGINEERS, ARCHITECTS, AND CONSULTING ENGINEERS

435 CHESTNUT STREET,

PHILADELPHIA, PENNSYLVANIA, U.S.A.

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CIRCULAR.

OUR firm was organized on January 1, 1876. Previous to that time the individuals composing it had been engaged for over fifteen years, in the active practice of their respective professions, in the service of leading railroad companies. Recognizing the changes that had taken place in the business of the country, and believing that the time had arrived for combining the professions of engineering and architecture in such a manner that corporations and individuals could avail themselves of the best professional advice without having to maintain an expensive staff, we associated ourselves together and offered our services to the public.

The theory of the organization was that there was a need for professional services, disconnected from and independent of the business of building or contracting; that the two branches of business should be kept entirely separate, and that corporations and individuals prosecuting engineering and architectural work would recognize the importance of and necessity for professional supervision distinct from the mechanical execution of the work.

We are not builders or contractors, but act strictly in a professional capacity. Having a large staff of assistants trained in their respective specialties, we are prepared to design and superintend the execution of any kind of engineering and architectural work.

We have the pleasure of submitting a list of some of the principal items of work which have been executed by our firm, or by its members during their professional career, and refer to this work in asking for future recognition.

WILSON BROTHERS & CO.

435 CHESTNUT STREET, PHILADELPHIA, PA.
MAY 1, 1885.

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PLANS AND SPECIFICATIONS FURNISHED FOR ROOFS, RAILWAY AND HIGHWAY BRIDGES, RAILWAY STATIONS, MACHINE SHOPS, ENGINE HOUSES, FACTORIES, PRIVATE DWELLINGS, CHURCHES, STORES, OFFICES, PRISONS, HOSPITALS, AND OTHER PUBLIC INSTITUTIONS, WATER-WORKS, SEWERAGE SYSTEMS, WHARVES, PIERS, AND ALL CLASSES OF ENGINEERING AND ARCHITECTURAL WORK.

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CIVIL ENGINEER AND ARCHITECT.

Member Institute of Civil Engineers (London, England).
Member American Society of Civil Engineers
Member Engineers' Club of Philadelphia.
Fellow American Institute of Architects.

F. G. THORN,

ARCHITECT.

Fellow American Institute of Architects.

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WM. M. LEVERING,

PRINCIPAL ASSISTANT ENGINEER.

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HENRY A. MACOMB,

PRINCIPAL ASSISTANT ARCHITECT.

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PRINCIPAL ASSISTANT ENGINEER IN CHARGE OF FIELD WORK.

O. B. COLTON,

PRINCIPAL ASSISTANT ENGINEER IN CHARGE OF CONSTRUCTION WORK.

Member American Society of Civil Engineers.
Member Engineers' Club of Philadelphia.

CHAS. G. DARRACH,

HYDRAULIC ENGINEER.

Member American Society of Civil Engineers.
Member Engineers' Club of Philadelphia.

JOHN A. WILSON

Graduated as Civil Engineer at the Rensselaer Polytechnic Institute, Troy, N. Y., in 1856. In April, 1857, he was appointed Topographer under Mr. John C. Trautwine, on surveys in Central America for the Honduras Inter-Oceanic Railway. In 1858 entered the service of the Pennsylvania Railroad Company as Assistant Engineer; in 1860 was promoted to the position of Principal Assistant Engineer, and until 1864 was engaged in the construction of railroad shops, bridges, and branch railroads in the neighborhood of Philadelphia. From 1861 to 1864 he also held the position of Chief Engineer of the Junction Railroad in Philadelphia, a piece of work involving varied and heavy construction. From 1864 to 1868 he occupied the position of Chief Engineer for the Pennsylvania Railroad Company, lessee of the Philadelphia and Erie Railroad; from 1868 to 1870, the position of Chief Engineer of Maintenance of Way on the main line of the Pennsylvania Railroad; and from 1870 to 1875, the position of Chief Engineer, in charge of construction of the Low Grade Division of the Allegheny Valley Railroad, and of branch roads for the Pennsylvania Railroad Company.

JOSEPH M. WILSON

Graduated as Civil Engineer at the Rensselaer Polytechnic Institute in 1858; afterwards took a special course of study in Philadelphia for two years, under Dr. F. A. Genth, in Analytical Chemistry; entered the service of the Pennsylvania Railroad Company, as Assistant Engineer, in 1860; from 1863 to 1865 served as Resident Engineer on the Middle Division of the Pennsylvania Railroad, and in the latter year was appointed Principal Assistant Engineer on the main line of the road in special charge of bridges. The title of his position was afterwards changed to that of Engineer of Bridges and Buildings, which position he has held continuously to the present date, its jurisdiction being very much enlarged from time to time to cover leased lines, etc. He was connected with the designing and construction of the most important buildings of the Centennial Exposition held at Philadelphia in 1876, and has made two visits to Europe, where he made a special study of hospital and prison construction, railway stations, bridges, etc.

FRED G. THORN

Studied his profession of Architect in the office of John McArthur, Jr., in Philadelphia. In 1857 he went to North Carolina, and practised his profession until 1861, when he returned to Mr. McArthur's office, and was engaged during the war in the construction of military hospitals. From 1863 to 1864 he was attached to the office of the Chief Engineer of the Pennsylvania Railroad at Altoona; from 1864 to 1868, was on the Philadelphia and Erie Railroad, with John A. Wilson; and from 1868 to 1876, was on the main line of the Pennsylvania Railroad, with the Chief Engineer and Engineer of Bridges and Buildings.

The members of the firm have all had a long and thorough training on the Pennsylvania Railroad and connecting lines during a time when that company was building up its magnificent system of roads, and in their various specialties have had extensive and varied experience in the location, construction, and management of railroads, and in the designing and constructing of bridges, buildings, terminal facilities, and everything which goes to make up the plant of a first-class railway. Their practical connection with the maintenance and use of their work through a term of years, in addition to its first construction, has given them an unusual opportunity to become familiar with details, and has enabled them, by their combination in one firm, to thoroughly cover a range of subjects not often brought together in one establishment.

STATEMENT

OF

SOME OF THE PRINCIPAL ITEMS OF WORK EXECUTED BY WILSON BROTHERS & CO.

SINCE JANUARY 1st, 1876,

INCLUDING SOME SPECIAL BRIDGES AND BUILDINGS DESIGNED BY THE MEMBERS OF THE FIRM PREVIOUS TO THAT DATE.

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Residence of B. K. Jamison, Esq., No. 3912 Walnut St...Philadelphia.
" Joseph D. Potts, Esq., No. 3905 Spruce St.. "
" Robert Gibson, Esq., No. 208 N. 34th St... "
" J. J. Martin, Esq., No. 1901 Green St..... "
" William Marks, Esq., No. 2221 Green St... "
Residence of Thomas W. Sparks, Esq., No. 213 N. 33d Street..... "
Residence of David D. Elder, Esq., No. 3504 Baring Street..... "
Residence of W. H. Wilson, Esq., No. 3501 Powelton Avenue..... "
Residence of Hon. John Scott, No. 3804 Chestnut St..... "
" F. G. Thorn, Esq., No. 205 N. 36th St..... "
Residence of Edward H. Williams, Esq., No. 101 N. 33d Street..... "
Residence of Theodore C. Engel, Esq., 16th St. above Jefferson St..... "
Three Houses for Thomas B. Shriver, Esq., cor. Jefferson and Wellington Sts..... "
Two Houses for W. H. Wilson, Esq., Nos. 302 and 304 N. 35th St..... "
Five Houses for H. S. Dickson, Esq., Falls of Schuylkill..... "
Residence of Henry J. Rife, Esq., George's Hill..... "
" J. P. Levan, Esq., Altoona.....Pennsylvania.

Residence of John H. Converse, Esq., Rosemont.....Pennsylvania.
Cottage for " " " " ..... "
Residence of Edward H. Williams, Esq., Rosemont..... "
" Edmund Smith, Esq., Villanova..... "
" Dr. Charles Brandis, Erie..... "
" F. J. Firth, Esq., Germantown..... "
" F. P. Weaver, Esq., Media..... "
Residence of Division Superintendent and Resident Engineer P. & E. R. R., Renovo..... "
Residence of Dr. W. C. Powell, Bryn Mawr..... "
Presbyterian Parsonage, Bryn Mawr..... "
Residence of John F. Betz, Jr., Port Kennedy..... "
" Robert Pitcairn, Esq., Shadyside..... "
" A. Hegewisch, Esq., Staten Island.....New York.
Residence of Professor of Astronomy, University of Virginia.....Virginia.
Residence of R. M. Foresman, Esq., Williamsport.....Pennsylvania.
" A. D. Lundy, Esq., Williamsport..... "
" Wm. H. Brown, Esq., Williamsport..... "
" Henry S. Snyder, Esq., Williamsport..... "
Rectory for Trinity Episcopal Church, Williamsport..... "
Residence of Governor Vance, Raleigh.....North Carolina.
" Wm. Tucker, Esq., Raleigh..... "
" Mrs. Boylan, Raleigh..... "
" Wm. S. Battles, Tarboro'..... "

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Seaside Cottage for Chas. T. Parry, Esq., Beach Haven....New Jersey.
" " William Parry, Esq., Beach Haven.... "
" " George Burnham, Jr., Beach Haven... "
" " John A. Wilson, Esq., Beach Haven.. "
Five Seaside Cottages for Messrs. Craige & Brooks, Atlantic City..... "
Seaside Cottage for D. A. Woelpper, Esq., Atlantic City.. "
" " H. P. Kremer, Esq., Atlantic City..... "
" " J. H. Forepaugh, Esq., Atlantic City.. "
" " Thomas B. Shriver, Esq., Spring Lake. "
Summer Residence of E. B. Warren, Esq., Green Island, Lake George.....New York.
Residence of Frank Thomson, Esq., Williamsport.....Pennsylvania.
" G. Bodell Moore, Esq., Williamsport..... "
" F. J. Firth, Esq., Williamsport..... "
" Robert W. Smith, Esq., Williamsport..... "
" Mrs. A. K. McClure, Wallingford..... "
" Chas. G. Darrach, Esq., Ridley Park..... "
" C. H. Savidge, Esq , Ridley Park..... "
" R. T. Sanders, Esq., Kinzer's..... "
" Mrs. E. Percival, Radnor..... "
" G. C. Anderson, Esq., Ardmore..... "
" W. P. Curl, Esq., Ardmore..... "
" E. B. Van Winkle, Esq., Paterson.....New Jersey.

Residence of Samuel C. Trimble, Esq., Penllyn.....Pennsylvania.
" G. M. Todd, Esq., Burlington.....New Jersey.
" R. C. Lowry, Esq., Staten Island.....New York.
Four Cottages for Terrence Donnelly, Esq., Staten Island..... "
Twenty-three Houses for Panama Canal Co.....Central America.
Two Officers' Houses, Hegewisch.....Illinois.
Two Workmen's Houses, Hegewisch..... "
Workmen's Boarding-House, Hegewisch..... "
Supervisor's House for Penna. R. R. Co., Walls.....Pennsylvania.
Workingmen's Houses for Penna. R. R. Co., Walls..... "
Two Cottages for Roanoke Stock-Yard Co., Roanoke...Virginia.
Twin Seaside Cottages for Rev. W. F. Paddock, Spring Lake.....New Jersey.
Superintendent's Dwelling for Penna. R. R. Co., Tyrone.....Pennsylvania.
Foreman's Dwelling for Penna. R. R. Co., Beatty's..... "
" " " " Conemaugh.. "
" " " " Derry..... "
" " " " Shadyside..... "
Foreman's Dwelling for Penna. R. R. Co., New Florence..... "
Agent's Dwelling for Penna. R. R. Co., Cresson..... "
" " " " McVeytown... "

STABLES.

For B. K. Jamison, Esq., No. 3912 Walnut St.....Philadelphia.
" Edward H. Williams, Esq., No. 101 N. 33d St..... "
" George Burnham, Esq., No. 2211 Green St..... "
" W. H. Wilson, No. 3501 Powelton Ave..... "
" Union Transfer Co., Juniper and Race Sts..... "
" Hon. Wayne MacVeagh, Brookfield.....Pennsylvania.
" Edward H. Williams, Esq., Rosemont..... "
" John H. Converse, Esq., Rosemont..... "
" Edmund Smith, Esq., Villanova..... "

For Mrs. A. K. McClure, Wallingford.....Pennsylvania.
" The Keystone Hotel Co., Bryn Mawr..... "
" Dr. R. T. Sanders, Kinzer's..... "
" State Hospital for the Insane, Norristown..... "
For R. C. Lowry, Esq., New Brighton, Staten Island.....New York.
For G. M. Todd, Esq., Burlington.....New Jersey.
" Union Transfer Co., Washington.....District of Columbia.

PUBLIC INSTITUTIONS.

State Hospital for the Insane, Norristown.....Pennsylvania.
State Industrial Reformatory, Huntingdon..... "
New County Prison (in progress), Philadelphia..... "
Presbyterian Hospital (three wards), Philadelphia..... "
Presbyterian Orphanage (four cottages), Philadelphia.... "
Germantown Dispensary Hospital (one ward), Philadelphia "
Educational Home, Philadelphia..... "
Divinity School of the Protestant Episcopal Church, Philadelphia..... "
Pennsylvania Industrial Home for Blind Women, Philadelphia..... "
Mission Building of the Episcopal Hospital, Philadelphia. "
Astronomical Observatory for United States Military Academy, West Point.....New York.
Leander McCormick Astronomical Observatory, University of Virginia.....Virginia.
The Norman Williams Memorial Library, Woodstock...Vermont.
Chapel, Library, and Dormitory, University of North Carolina, Chapel Hill.....North Carolina.
Conservatory and Lecture-Room, Ontario Agricultural College, Guelph.....Canada.
Court-House, Yanceyville.....North Carolina.
Trinity Protestant Episcopal Church, Williamsport.....Pennsylvania.
St. Andrew's Protestant Episcopal Church, 36th and Baring Sts.....Philadelphia.
Seaside Memorial Chapel, Beach Haven..... ...New Jersey.
Protestant Episcopal Church, Greenville..... North Carolina.
Chapel for Divinity School of the Protestant Episcopal Church.....Philadelphia.
Sunday-School Building, St. James' Protestant Episcopal Church, 22d and Walnut Sts..... "
Sunday-School Building, St. James' Church, Bristol.....Pennsylvania.
" " Wayne Station..... "
German Reformed Church, Altoona..... "
Baptist Church, Raleigh.....North Carolina.
Protestant Episcopal Church, Goldsboro'..... "
Trinity Chapel, Williamsport.....Pennsylvania.

HOTELS.

Bryn Mawr Hotel, Bryn Mawr.....Pennsylvania.
Renovo Hotel, Renovo..... "
Trans-Continental Hotel, 44th St. and Elm Ave..... .....Philadelphia.
Philadelphia Stock-Yard Co.'s Hotel, 30th and Race Sts... "
Richmond and Danville R. R. Co.'s Hotel, Wolf Trap.....Virginia.
The Mountain House, Cresson Springs.....Pennsylvania.
The Sagamore, Green Island, Lake George.....New York.
The Baldwin, Beach Haven.....New Jersey.
Extension of the Logan House, Altoona.....Pennsylvania.

ALTERATIONS OF AND ADDITIONS TO BUILDINGS.

Stores for Julia F. Pierson, Nos. 818 and 820 Chestnut St...Philadelphia.
Store for G. W. Kendrick, Esq., 3d and South Sts..... "
Store Front, No. 26 S. 7th St..... "
Dwelling for John H. Converse, Esq., No. 241 N. 18th St... "
" C. P. B. Jefferys, 3928 Walnut St..... "
" Henry K. Kelly, Esq., No. 233 S. 17th St..... "
" Chas. T. Parry, Esq., No. 1921 Arch St..... "
Dwelling for J. N. DuBarry, Esq., No. 2017 Spruce St.....Philadelphia.
Dwelling for Frank McLaughlin, Esq., No. 3807 Chestnut Street..... "
Dwelling for G. W. Kendrick, Esq., No. 3507 Baring St..... "
" George Burnham, Esq., No. 2211 Green St.... "
" R. M. Girvin, M.D., No. 3906 Walnut St..... "
" Wm. Thomson, M.D., No. 1502 Locust St..... "

ALTERATIONS OF AND ADDITIONS TO BUILDINGS.—Continued.

Dwelling for John A. Wilson, Esq., No. 302 N. 35th St....Philadelphia.
Dwelling for Thomas B. Shriver, Esq., No. 1428 N. 16th Street..... "
Dwelling for Henry M. Dechert, Esq., No. 3914 Walnut Street..... "
Dwelling for John Jameson, Esq., Milford.....New Jersey.
" B. D. T. Travis, Esq., Burlington..... "
" Josiah Bacon's Estate, Torresdale.....Pennsylvania.
" Thomas R. Kennedy, Esq., Chambersburg.... "
" A. N. Turner, Esq., Parkesburg..... "
" G. C. Gardiner, Esq., Greenfield.....Massachusetts.
Cottage for J. M. Schoonmaker, Esq., Cresson.....Pennsylvania.
" M. W. Watson, Esq., Cresson..... "
" G. W. Mullen, Esq., Cresson..... "
Gate Lodge for John H. Converse, Esq., Rosemont..... "
Offices for John C. Bullitt, Esq., No. 32 S. 3d St.....Philadelphia.
" Lewis Stover, Esq., No. 36 S. 3d St..... "
Building for Maxim Electric Light and Power Co., Chester and Maple Sts..... "
Warerooms for William D. Rogers, Son & Co., No. 1009 Chestnut St..... "
Mill Building for J. W. Supplee, Esq., Market St. above 30th St.....Philadelphia.
Tenant House for William J. Howard, Esq., Spring Hill..Pennsylvania.
Foundry Building for David S. Cresswell, Esq., 814 Race Street.....Philadelphia.
Billiard Parlor for Jas. Donaldson, Esq., Filbert St. above Broad St..... "
Alterations to Girard House, 9th and Chestnut Sts..... "
" Rink Building, 23d and Chestnut Sts..... "
Alterations to United American Mechanics' Hall, 4th and George Sts..... "
Alterations to Market House, 16th and Market Sts..... "
Repairs to Tower of Synagogue, Broad and Green Sts..... "
" North Broad St. Presbyterian Church..... "
" M. E. Church, 20th and Jefferson Sts..... "
" Presbyterian Church, Walnut St. below 40th St. "
Dwelling House of A. L. Cram, Esq., Adams St., Germantown..... "
Dwelling House of A. G. Shiffler, Williamsport.....Pennsylvania.
Alterations to United States Hotel, Atlantic City.....New Jersey.
Extension of Lake Mahonk Hotel, Lake Mahonk.....New York.

STORES, WAREHOUSES, AND MISCELLANEOUS BUILDINGS.

Stores and Warehouse for W. W. Hale, Esq., Philipsburg.....Pennsylvania.
Warehouse for the National Storage Co., Communipaw..New Jersey.
Office Building for the Pittsburg, Cincinnati and St. Louis Railway Co., Pittsburg.....Pennsylvania.
Office Building for Messrs. A. M. & W. M. Fuller, Jersey City.....New Jersey.
Office Building for Dr. C. R. Early, Ridgway.....Pennsylvania.
" " Dr. Theodore Foote, Vineland.....New Jersey.
Office Building for the Empire Transportation Co., Bradford.....Pennsylvania.
Office Building for the Russell & Irwin Manufacturing Co., New Britain.....Connecticut.
Office Building for the Baldwin Locomotive Works, 500 N. Broad St.....Philadelphia.
The Times Building, 8th and Chestnut Sts..... "
Banking House for Drexel & Co., 5th and Chestnut Streets..... "
Pennsylvania Warehousing Co.'s Building, Front and Lombard Sts..... "
Red Lion Market House, 2d and Noble Sts..... "
Fairmount Ave. Market House, Fairmount Ave. Wharf. "
Abattoir, Cooling Room, Barn, Office Building, etc., for the Philadelphia Stock-Yard Co..... "
Electrical Exhibition Building for the Franklin Institute, 32d and Lancaster Ave..... "

STORES, WAREHOUSES, AND MISCELLANEOUS BUILDINGS.—Continued.

Store Building for Wm. Keinath, Esq., No. 924 Arch Street.....Philadelphia.
Store Building for Dr. Wm. Thomson, No. 804 Chestnut St..... "
Store Building for B. S. Janney, Jr., Nos. 121 and 123 Market St..... "
Banking House for Wm. M. Lloyd & Co., Altoona....Pennsylvania.
Five Store Buildings for the Wernwag Estate, Nos. 1709–1717 Chestnut St.....Philadelphia.
Three Store Buildings for A. J. Holman, Esq., Nos. 1222–1226 Arch St..... "
Banking House for Bank of North Carolina, Raleigh..North Carolina.
Forrest Concert Garden Co.'s Building, Broad and Master Sts.....Philadelphia.
Concert Garden Building, Belmont Ave.....West Philadelphia.
Greenhouse for Dr. E. H. Williams, 33d and Arch Sts. "
" F. T. S. Darley, No. 1118 Chestnut St..Philadelphia.
" W. H. Wilson, No. 3501 Powelton Ave. "
" Josiah Bacon, Torresdale.....Pennsylvania.
Extension of Penna. R. R. Co.'s General Office Building, No. 233 S. 4th St.....Philadelphia.
Northern Central Railway Co.'s General Office Building, Baltimore.....Maryland.
Northern Central Railway Co.'s General Office Building, Canton..... "
Frazer Burial Vault, Greenwood Cemetery, Brooklyn..New York.

Stabrock Market House, Demerara.....South America.
Adams Express Co.'s Freight Depot, Pittsburg.....Pennsylvania.
Stockton Bath House Establishment, Cape May.....New Jersey.
Iron Roofs for Depot of the Matanzas R. R.....Cuba.
Live Stock Exhibition Buildings for the Centennial Board of Finance.....Philadelphia.
Exhibition Building for the Empire Transportation Co., Centennial Exposition..... "
Office Building for the Times Publishing Co., Centennial Exposition..... "
Designs of Various Structures for Utilizing the Ironwork of the Main Building of the Centennial Exposition..... "
School House, Altoona.....Pennsylvania.
Dispatcher's Office for the Penna. R. R. Co., Harrisburg..... "
Switch Towers for the Penna. R. R. Co.
Standard Signal Tower for the Penna. R. R. Co.
Pumping Station at the Spring Garden Water-Works.....Philadelphia.
Freight Sheds for the American Steamship Co, Christian St. Wharf..... "
Freight Sheds for the Red Star Steamship Co., Jersey City.....New Jersey.
Steamship Sheds for the New York, West Shore and Buffalo R. R. Co., Weehawken..... "

RAILROAD STATIONS.

Penna. R. R Co.'s Passenger Station at Broad St.....Philadelphia.
Penna. R. R. Co.'s Passenger Station at 32d and Market Streets..... "
Penna. R. R. Co.'s Passenger Station at Centennial Grounds..... "
Penna. R. R. Co.'s Passenger Station at Girard Ave..... "
" " " " 52d St..... "
" " Freight Station at Dock St..... "

Penna. R. R. Co.'s Passenger Station at foot of Courtland Street.....New York City.
Penna. R. R. Co.'s Emigrant Station at Pier 1, North River..... " "
Penna. R. R. Co.'s Freight Station at Pier 28, North River..... " "
New Jersey R. R. Co.'s Passenger Station at Jersey City..New Jersey.
" " " " Rahway..... "

RAILROAD STATIONS.—Continued.

New Jersey R. R. Co.'s Passenger Station at New Brunswick (Suydam St.).....New Jersey.
Philadelphia and Trenton R. R. Co.'s Passenger Station at Tacony.....Pennsylvania.
Philadelphia and Trenton R. R. Co.'s Passenger Station at Holmesburg..... "
Philadelphia and Trenton R. R. Co.'s Passenger Station at Borie's..... "
Philadelphia and Trenton R. R. Co.'s Passenger Station at Pierson's..... "
Philadelphia and Trenton R. R. Co.'s Freight Station at Trenton.....New Jersey.
Penna. R. R. Co.'s Passenger Station at Mantua.....Philadelphia.
" " " " Overbrook.....Pennsylvania.
" " " " and Dwelling at Elm. "
" " " " at Wynnewood..... "
" " " " Ardmore..... "
" " " " Bryn Mawr..... "
" " Freight Station at Bryn Mawr..... "
Penna. R. R. Co.'s Passenger Station and Dwelling at Villanova..... "
Penna. R. R. Co.'s Passenger Station at Wayne..... "
" " " " Berwyn..... "
" " " " Paoli..... "
Penna. R. R. Co.'s Passenger and Freight Station at Frazer..... "
Penna. R. R. Co.'s Freight Station at Berwyn..... "
" " " " Paoli..... "
" " Passenger Station at West Chester..... "
" " Freight Station at Downingtown..... "
Penna. R. R. Co.'s Passenger Station and Dwelling at Coatesville..... "
Penna. R. R. Co.'s Passenger and Freight Station at Gap.. "
" " " Station at Mount Joy..... .. "
" " " " McVeytown..... "
" " " " Huntingdon..... "
" " " " Tyrone..... "
" " " " Bell's Mills ..... "
" " " " Altoona..... "

Penna. R. R. Co.'s Passenger Station at Hollidaysburg.....Pennsylvania.
" " " " Wilmore..... "
" " " " Walls ..... "
Penna. R. R. Co.'s Passenger Station and Dwelling at Turtle Creek..... "
Penna. R. R. Co.'s Passenger Station at Bessemer..... "
" " " " Braddock..... "
" " " " Hawkins..... "
" " " " Edgewood..... "
" " " " Homewood..... "
" " " " Baldwin..... "
" " " " Roup ..... "
" " " " Shadyside..... "
" " Emigrant Station at Pittsburg..... "
Penna. R. R. Co.'s Passenger and Freight Station at Bellevue..... "
Penna. R. R. Co.'s Passenger and Freight Station at Oakland..... "
Penna. R. R. Co.'s Passenger and Freight Station at Marietta..... "
Penna. R. R. Co.'s Passenger and Freight Station at Watts..... "
Penna. R. R. Co.'s Passenger and Freight Station at Grapeville..... "
Penna. R. R. Co.'s Passenger Station and Dwelling at Mapleton..... "
Penna. R. R. Co.'s Freight Station at Mapleton..... "
" " " " Columbia..... "
" " Passenger Station at Columbia..... "
" " Standard Shelters.
" " " Flag Stations.
West Pennsylvania R. R. Co.'s Passenger Station at Claremont..... "
West Pennsylvania R. R. Co.'s Passenger Station at Allegheny City..... "
West Pennsylvania R. R. Co.'s Passenger Station at Sharpsburg..... "
West Pennsylvania R. R. Co.'s Passenger Station at Allegheny Junction..... "

RAILROAD STATIONS.—Continued.

Northern Central Railway Co.'s Passenger Station at Watkins.....New York.
Philadelphia and Erie R. R. Co.'s Passenger Station at Williamsport.....Pennsylvania.
Philadelphia and Erie R. R. Co.'s Passenger Station at Sunbury..... "
Philadelphia and Erie R. R. Co.'s Passenger and Freight Station at Kane..... "
Philadelphia and Erie R. R. Co.'s Passenger and Freight Station at Cameron..... "
Allegheny Valley R. R. Co.'s Passenger Station at Brookville..... "
Tyrone and Clearfield R. R. Co.'s Passenger Station at Clearfield..... "
Milton and Centre Co. R. R. Co.'s Passenger Station at Reedsville..... "
Lewisburg, Centre and Spruce Creek R. R. Co.'s Passenger and Freight Station at Mifflinburg... "
Baltimore and Potomac R. R. Co.'s Passenger Station at Washington.....District of Columbia.
Belvidere Delaware R. R. Co.'s Passenger Station at Lambertville.....New Jersey.
Belvidere Delaware R. R. Co.'s Passenger Station at Milford..... "
Belvidere Delaware R. R. Co.'s Passenger Station at Trenton (Warren St.)..... "
Philadelphia and Long Branch R. R. Co.'s Passenger Station at Sea Girt..... "
West Jersey R. R. Co.'s Passenger Station at Cape May..... "
Syracuse, Geneva and Corning R. R. Co.'s Passenger Station at Watkins Glen.....New York.
North Pennsylvania R. R. Co.'s Passenger Station at Ashburn.....Pennsylvania.
Cumberland Valley R. R. Co.'s Passenger Station at Hagerstown.....Maryland.
New York, West Shore and Buffalo R. R. Co.'s Passenger Station (including Ferry Houses, Slips, Transfer Bridges, etc.) at Weehawken..... New Jersey.

Tyrone and Clearfield R. R. Co.'s Freight Station at Clearfield..... Pennsylvania.
Penna. R. R. Co.'s Freight Station at Garrett's Siding..... "
" " " " Beatty's..... "
" " " " Thorndale..... "
" " " " Cresson..... "
" " " " Duncannon..... "
" " " " East Liberty..... "
" " " " Birmingham..... "

NEW YORK, WEST SHORE AND BUFFALO R. R. CO.'S PASSENGER AND FREIGHT STATIONS, AS FOLLOWS:

At Marlboro'.....New York.
" Milton..... "
" Highland..... "
" West Park..... "
" Mount Marion..... "
" West Camp..... "
" Catskill..... "
" West Athens..... "
" Coxsackie..... "
" Fort Hunter..... "
" Fultonville..... "
" Canajoharie..... "
" Fort Plain..... "
" St. Johnsville..... "
" Indian Castle..... "
" Fort Herkimer..... "
" Mohawk..... "
" Ilion..... "
" Frankfort..... "
" Clark's Mills..... "
" Canastota..... "
" Chittenango..... "
" Kirkville..... "
" Manlius..... "
" Amboy..... "
" Warner's..... "

RAILROAD STATIONS.—Continued.

At Weedsport.....New York.
" Savannah..... "
" Clyde..... "
" Lyons..... "
" Newark..... "
" Point Gibson..... "
" Palmyra..... "
" Macedon..... "
" Fairport..... "
" Pittsford..... "
" Chili..... "
" Bergen..... "
" Byron..... "
" Elba..... "
" Akron..... "
" Clarence Hollow..... "
" Bowmansville..... "
New York and New England R. R. Co.'s Passenger Station at Boston.....Massachusetts.
Elizabeth City and Norfolk R. R. Co.'s Standard Passenger Station.
Buffalo, Pittsburg and Western R. R. Co.'s Passenger Station at Oil City.....Pennsylvania.
Buffalo, Pittsburg and Western R. R. Co.'s Passenger Station at Dunkirk..... "
Buffalo, Pittsburg and Western R. R. Co.'s Passenger Station at Kinzua..... "
Buffalo, Pittsburg and Western R. R. Co.'s Freight Station at Kinzua..... "
Buffalo, Pittsburg and Western R. R. Co.'s Freight Station at Dunkirk..... "

NEW YORK ELEVATED R. R. CO.'S PASSENGER STATIONS, AS FOLLOWS:

One at South Ferry.....New York.
" Hanover Square..... "
" Fulton and Pearl Sts..... "
" Franklin Square..... "
One at Chatham Square.....New York.
" City Hall..... "
Two at Canal St. and Bowery..... "
One at Grand St..... "
Two at Houston St..... "
" 9th St. and 3d Ave..... "
" 14th St. and 3d Ave..... "
" 18th St. and 3d Ave..... "
" 23d St. and 3d Ave..... "
" 28th St. and 3d Ave..... "
" 34th St. and 3d Ave..... "
One at 34th St. and East River..... "
" Grand Central Depot..... "
Two at 42d St. and 3d Ave..... "
" 47th St. and 3d Ave..... "
" 53d St. and 3d Ave..... "
" 59th St. and 3d Ave..... "
" 67th St. and 3d Ave..... "
" 76th St. and 3d Ave..... "
" 84th St. and 3d Ave..... "
" 89th St. and 3d Ave..... "
One at 99th St. and 3d Ave..... "
Two at 106th St. and 3d Ave..... "
" 110th St. and 3d Ave..... "
" 116th St. and 3d Ave..... "
" 120th St. and 3d Ave..... "
" 125th St. and 3d Ave..... "
One at 129th St. and 3d Ave..... "
Two at Rector and Greenwich Sts..... "
" Courtland and Greenwich Sts..... "
" Barclay and Greenwich Sts..... "
" Warren and Greenwich Sts..... "
" Franklin and Greenwich Sts..... "
" Desbrosses and Greenwich Sts..... "
" Houston and Greenwich Sts..... "
" Christopher and Greenwich Sts..... "
" 14th St. and 9th Ave..... "
" 23d St. and 9th Ave..... "

RAILROAD STATIONS.—Continued.

Two at 30th St. and 9th Ave.....New York.
" 34th St. and 9th Ave..... "
" 42d St. and 9th Ave..... "
" 50th St. and 9th Ave..... "
Two at 59th St. and 9th Ave.....New York.
" 72d St. and 9th Ave..... "
" 81st St. and 9th Ave..... "

MACHINE SHOPS, FACTORIES, CAR SHOPS, Etc.

Erecting Shop for the New York, West Shore and Buffalo R. R. Co. at New Durham.....New Jersey.
Thirty-three Stall Round House for the New York, West Shore and Buffalo R. R. Co. at New Durham ..... "
Twenty-two Stall Round House for the New York, West Shore and Buffalo R. R. Co. at Weehawken ..... "
Main Erecting Shop for the New York, West Shore and Buffalo R. R. Co. at Frankfort..... "
Machine Shop for the New York, West Shore and Buffalo R. R. Co. at Frankfort..... "
Foundry for the New York, West Shore and Buffalo R. R. Co. at Frankfort..... "
Blacksmith Shop for the New York, West Shore and Buffalo R. R. Co. at Frankfort..... "
Planing Mill for the New York, West Shore and Buffalo R. R. Company at Frankfort..... "
Sixty Stall Freight Car Repair Shop for the New York, West Shore and Buffalo R. R. Co. at Frankfort..... "
Forty-four Stall Round House for the New York, West Shore and Buffalo R. R. Co. at Frankfort..... "
Five Stall Engine House for the New York, West Shore and Buffalo R. R. Co. at Kingston.....New York.
Eight Stall Engine House for the New York, West Shore and Buffalo R. R. Co. at Coeyman's..... "
Five Stall Engine House for the New York, West Shore and Buffalo R. R. Co. at Syracuse..... "
Eight StallEngine House for the New York, West Shore and Buffalo R. R. Co. at Newark..... "
Sixty-six Stall Freight Car Erecting Shop for the New York, West Shore and Buffalo R. R. Co. at Buffalo..... "
Twenty-two Stall Round House for the New York, West Shore and Buffalo R. R. Co. at Buffalo.....New York.
Blacksmith Shop for the New York, West Shore and Buffalo R. R. Co. at Buffalo..... "
Repair Shop for the New York, West Shore and Buffalo R. R. Co. at Buffalo..... "
Twenty-two Stall Car Repair Shop for the New York, West Shore and Buffalo R. R. Co. at Buffalo..... "
Machine Shop for the New York Elevated R. R. Co. at..New York City.
Blacksmith Shop " " " " " .. "
Boiler Shop " " " " " .. "
Car Shops " " " " " .. "
Paint Shop " " " " " .. "
Engine House " " " " " .. "
Storehouse and Office for the New York Elevated R. R. Co. at..... "
Machine Shop for the Colorado Coal and Iron Co. at Pueblo.....Colorado.
Rolling Mill for the Colorado Coal and Iron Co. at Pueblo..... "
Foundry for the Colorado Coal and Iron Co. at Pueblo.. "
Forty-four Stall Round House for the Allegheny Valley R. R. Co. at Verona.....Pennsylvania.
Machine Shop for the Allegheny Valley R. R. Co. at Verona..... "
Car Shops for the Allegheny Valley R. R. Co. at Verona..... "
Blacksmith Shop for the Allegheny Valley R. R. Co. at Verona..... "
Planing Mill for the Allegheny Valley R. R. Co. at Verona "

MACHINE SHOPS, FACTORIES, CAR SHOPS, Etc.—Continued.

Stationary Engine House for the Allegheny Valley R. R. Co. at Verona.....Pennsylvania.
Machine Shop for the Rogers Locomotive Works at Paterson.....New Jersey.
Extension of Retort House for the Altoona Gas and Water Co. at Altoona.....Pennsylvania.
Barrel Factory for Messrs. Warden, Frew & Co. at Point Breeze.....Philadelphia.
Flue Mill for the Allison Manufacturing Co. at 32d and Walnut Sts..... "
Freight Car Construction Shops for the United States Rolling Stock Co., consisting of Wood-Working Mill, Car Erecting Shop, Boiler House, Blacksmith Shop, Machine Shop, Car Truck Shop, General Store Building, Paint and Oil Stores, and General Office Building at Hegewisch.....Illinois.
Machine Shop and Engine House for the Tyrone and Clearfield R. R. at Tyrone.....Pennsylvania.
Engine House for the Tyrone and Clearfield R. R. at Clearfield..... "
Extension to Engine House for the Philadelphia and Erie R. R. at Sunbury..... "
Roof Trusses for Rolling Mill for the Pencoyd Iron Works at Pencoyd..... "
Planing Mill for William Nice, Jr., at.....Philadelphia.
Factory for A. J. Holman, Esq., Cuthbert St. above 12th St. "
Machine Shop for the Northern Central Railway Co. at Baltimore.....Maryland.
Blacksmith Shop for the Northern Central Railway Co. at Baltimore..... "
Boiler Shop for the Northern Central Railway Co. at Baltimore..... "
Foundry for the Northern Central Railway Co. at Baltimore..... "
Office and Store Building for the Northern Central Railway Co. at Baltimore..... "
Engine House for the Penna. R. R. Co. at Paoli.....Pennsylvania.
Steam Boiler and Pump House for the Penna. R. R. Co. at Columbia..... "
Repair Shops for the Penna. R. R. Co. at Columbia...Pennsylvania.
Forty-four Stall Round House for the Penna. R. R. Co. at Columbia..... "
Freight Car Repair Shop for the Penna. R. R. Co. at..West Philadelphia.
Forty-four Stall Round House for the Penna. R. R. Co. at..... "
Forty-four Stall Round House for the Penna. R. R. Co. at Harrisburg.....Pennsylvania.
Forty-four Stall Round House (No. 3) for the Penna. R. R. Co. at Altoona..... "
Rebuilding Roof of Round House (No. 1) for the Penna. R. R. Co. at Altoona..... "
Twenty-three Stall Round House for the Penna. R. R. Co. at Pittsburg..... "
Thirty-eight Stall Round House for the Penna. R. R. Co. at Pittsburg..... "
Forty-four Stall Round House for the Penna. R. R. Co. at Pittsburg..... "
Locomotive Machine Shop Extension for the Penna. R. R. Co. at Altoona..... "
Locomotive Blacksmith Shop Extension for the Penna. R. R. Co. at Altoona..... "
Roof Trusses for Locomotive Erecting Shop for the Penna. R. R. Co. at Altoona..... "
Main Roof for Iron Foundry for the Penna. R. R. Co. at Altoona..... "
Passenger Car Shop for the Penna. R. R. Co. at Altoona..... "
Freight Car Shop for the Penna. R. R. Co. at Altoona..... "
Machine Cabinet Shop for the Penna. R. R. Co. at Altoona..... "
Paint and Upholstery Shop for the Penna. R. R. Co. at Altoona..... "
Blacksmith Shop for the Penna. R. R. Co. at Altoona. "
Engine and Boiler House for the Penna. R. R. Co. at Altoona..... "
Planing Mill for the Penna. R. R. Co. at Altoona..... "
Lumber Shop and Sheds for the Penna. R. R. Co.

MACHINE SHOPS, FACTORIES, CAR SHOPS, Etc.—Continued.

Drying House for the Penna. R. R. Co. at Altoona.....Pennsylvania.
Paint Stores for the Penna. R. R. Co. at Altoona..... "
Office and Store Room for the Penna. R. R. Co. at Altoona..... "
Stable and Fire Engine House for the Penna. R. R. Co. at Altoona..... "
Maintenance of Way Blacksmith and Machine Shop for the Penna. R. R. Co. at Altoona..... "
Maintenance of Way Carpenter Shop for the Penna. R. R. Co. at Altoona..... "
Maintenance of Way Paint and Tin Shop for the Penna. R. R. Co. at Altoona..... "
Maintenance of Way Store House and Office for the Penna. R. R. Co. at Altoona..... "
Oil House for the Penna. R. R. Co. at Altoona..... "
" " " " West Philadelphia. "
" " " " Pittsburg..... "
Grain Warehouse for the Penna. R. R. Co. at West Philadelphia..... "

Car Shed for the Penna. R. R. Co. at Huntingdon.....Pennsylvania.
Storehouse for the Penna. R. R. Co. at West Philadelphia Shops..... "
Machine Shop for the Philadelphia and Erie R. R. Co. at Kane..... "
Blacksmith Shop for the Philadelphia and Erie R. R. Co. at Kane..... "
Round House for the Philadelphia and Erie R. R. Co. at Kane..... "
Boiler and Engine House for the Philadelphia and Erie R. R. Co. at Kane..... "
Machine Shop for the Philadelphia and Erie R. R. Co. at Erie..... "
Blacksmith Shop for the Philadelphia and Erie R. R. Co. at Erie..... "
Round House for the Philadelphia and Erie R. R. Co. at Erie..... "
Boiler and Engine House for the Philadelphia and Erie R. R. Co. at Erie..... "

EXPERT WORK.

Shop Inspection of Bridges for Adelaide and Nairne Railway.....Australia.
Shop Inspection of Iron Work for Nowra Bridge..... "
Shop Inspection of Iron Work for Bridges on the New York, Pennsylvania and Ohio R. R.
Shop Inspection of Broad River Bridge for Greenville and Columbia R. R. Co.
Shop Inspection of Bridges for New York and New England R. R. Co.
Report on Site for New City Prison.....Philadelphia.
" " Middle Penitentiary.....Pennsylvania.
" Canastota, Cazenovia and De Ruyter R. R.
" Indianapolis and Springfield R. R.
" St. Louis and Danville R. R.

Report on Readjustment of Tracks, Yards, Stations, etc., between the Various Railroads Centreing at Willimantic.....Connecticut.
Report on Relocation of Railroads and Stations in the City of Providence.....Rhode Island.
Report on Property of the Clifton Hydraulic Mining Co.....Arizona.
" Bituminous Coal Property in Clinton County.....Pennsylvania.
" " " " Allegheny County, "
Report on Vosburg Tunnel, Lehigh Valley R. R.
" Steam Supply for Cities.
Report on Roof Trusses for Union Passenger Depot, Cleveland.....Ohio.
Report on Bridge over Neshaminy Creek for Bristol Turnpike Co.....Pennsylvania.

EXPERT WORK.—Continued.

Report on Bridges on Cumberland Valley R. R.
Report on Wissahickon Creek Bridge, Philadelphia and Norristown R. R.
Report on Construction of City Hall.....Philadelphia.
" Plant for Plate Glass Works, Huntingdon.....Pennsylvania.
Report on Trestle Work, etc., for the Cannelton Coal Co.....West Virginia.
Report on Drawbridge for Camden and Atlantic R. R. Co.
Report on Plans for Cuyahoga Creek Bridge, for Lake Shore and Michigan Southern R. R. Co., Cleveland.....Ohio.
Report on Tunnel and Passenger Station, St. Louis.....Missouri.
Heating Apparatus for Building, and Designs for Music Hall for Wm. Pickhardt, 5th Ave. and 74th St.....New York City.
Consultation Relative to Plans for Bridge over Schuylkill River at Market St.....Philadelphia.
Consultation Relative to Strengthening Bridge over Schuylkill River at Chestnut St..... "
Consultation Relative to Condition of Iron Structures of the Elevated R. R.....New York City.
Consultation Relative to Proposed Bridge over Hudson River at Peekskill.....New York.
Consultation Relative to Arranging Approaches of East River Suspension Bridge.....New York City.
Annual Inspection during the past nine years, by Joseph M. Wilson, of all Bridges on the Lines of Railway East of Pittsburg and Erie, owned, controlled, or operated by the Penna. R. R. Co. in the States of New York, Pennsylvania, New Jersey, Delaware, Maryland, and Virginia.

JOHN A. WILSON HAS BEEN CONNECTED, AS EXPERT WITNESS OR OTHERWISE, WITH THE LITIGATION IN THE FOLLOWING CASES, VIZ.:

East Park Reservoir Case.....Philadelphia.
Hart Creek Sewer Case..... "
Accident on Pickering Valley R. R.....Pennsylvania.

AND RAILROAD GRADE CROSSINGS CASES, AS FOLLOWS:

New York, Lackawanna and Western R. R. *vs.* New York, Lake Erie and Western R. R. at Buffalo.....New York.
New York, Lackawanna and Western R. R. *vs.* Lake Shore and Michigan Southern R. R. at Buffalo..... "
Lehigh Valley R. R. Co. *vs.* New York Central R. R. Co. at Buffalo..... "
North and West Branch Railway *vs.* Catawissa R. R.....Pennsylvania.
Shamokin, Sunbury and Lewisburg R. R. *vs.* Northern Central Railway at Sunbury..... "
Catawissa R. R. *vs.* Philadelphia and Erie R. R..... "
Pottsville and Mahanoy R. R. *vs.* Philadelphia and Reading R. R. at Pottsville..... "

RAILROADS, Etc.

DURING THE PAST FEW YEARS JOHN A. WILSON HAS ACTED AS CHIEF ENGINEER FOR THE FOLLOWING RAILROADS:

North and West Branch Railway.....Pennsylvania.
Staten Island Rapid Transit R. R., Staten Island.....New York.
Bellefonte and Buffalo Run R. R.....Pennsylvania.
Nittany Valley and Southwestern R. R..... "
Columbia and Sullivan County R. R..... "
Pittston and Hawley R. R. (Location)..... "

TOPOGRAPHICAL SURVEYS AND MAPS HAVE BEEN MADE OF PROPERTIES AT

Bryn Mawr.....Pennsylvania.
Norristown..... "
Rosemont..... "
Villanova..... "
Near Germantown..... "
Fort Washington..... "
Green Island, Lake George.....New York.
Thompson's Point.....New Jersey.

MISCELLANEOUS WORK.

Wharf on Delaware River, below Tasker St., for the Hollingsworth Estate.....Philadelphia.
Wharf at Lazaretto for the Board of Health of the City..... "
Steamboat Landing at Green Island, Lake George.....New York.
Trestle Work for the Construction of the City Hall, Broad and Market Sts..... .....Philadelphia.
Design of Hoisting Machinery for Tower of City Hall, Broad and Market Sts..... "
Fire Escape at Continental Hotel..... "
Fire Escape at Children's Home, 40th and Baring Sts.....Philadelphia.
Design for Terminal of the New York, West Shore and Buffalo R. R. Co., including arrangement of Yard, Tracks, Piers, Docks, Buildings, etc., at Weehawken..New Jersey.
Design for Terminal of New York and New England R. R. at South Boston..... .....Massachusetts.
Design for Terminal of Camden and Atlantic Railroad at Camden..... .....New Jersey.

RAILROAD BRIDGES.

IRON TRUSSES.

LOCATION.	OWNER.	No. of Spans.	No. of Tracks.	Total Length.	Total Length Single Track.
				Feet.	Feet.
Pine Creek, near Allegheny City, Pa.	West Pennsylvania R. R.	1	2	110	220
Gwynn's Falls.	Baltimore and Potomac R. R.	4	2	510	1020
Susquehanna Canal, East of Rockville, Pa.	Pennsylvania R. R.	1	2	114	228
Bridge over Allegheny Avenue, Philadelphia.	Philadelphia, Germantown and Chestnut Hill R. R.	3	2	258	516
Manayunk, Pa.	Pennsylvania Schuylkill Valley R. R.	11	2	1189	2378
Phœnixville, Pa.	" " " "	5	2	838	1676
Mt. Clare Viaduct, Pa.	" " " "	4	2	380	760
Schuylkill River, Reading, Pa.	" " " "	4	2	682	1364
Little Dam, Pa.	" " " "	5	2	725	1450
Poplar Neck, Pa.	" " " "	6	2	788	1576
Monocacy, Pa.	" " " "	1	2	194	388
Connellsville, Pa.	Southwest Pennsylvania R. R.	4	1	480	480
Darby Creek, Pa.	Philadelphia, Wilmington and Baltimore R. R.	1	2	155	310
Mayland's Creek, Pa.	Junction R. R.	1	2	132	264
Chester Creek, Pa.	Philadelphia, Wilmington and Baltimore R. R.	1	2	158	316
Jones's Falls, Baltimore.	Northern Central Railway.	1	3	156	468
Bridge No. 15.	Tyrone and Clearfield R. R.	2	1	290	290
Arsenal, Philadelphia.	Pennsylvania R. R.	2	1	382	382
Bridge over Girard Avenue, Philadelphia.	Connecting Railway.	1	2	130	260
Communipaw, N. J.	National Storage Co.	2	2	386	772
Bridge over Montgomery Avenue, Jersey City.	" " "	1	2	112	224
" Johnson's " "	" " "	1	2	100	200
" Pacific " "	" " "	1	2	150	300
" Wayne Street, Jersey City.	" " "	1	2	85	170
" Academy Street, "	" " "	1	2	75	150
" Garrabraut Street, "	" " "	1	2	62	124
Oil City, Pa.	Allegheny Valley R. R.	3	1	685	685
Mahoning Creek, Pa.	" " "	2	1	316	316
Perequillo River, Mexico.	Mexican National Construction Co.	1	1	138	138
Chinos " "	" " " "	1	1	154	154
Armeria " "	" " " "	4	1	830	830
Comala " "	" " " "	1	1	138	138
Colima " "	" " " "	1	1	104	104
Bridge No. 8.	" " " "	1	1	67	67
" " 11.	" " " "	1	1	58	58
" " 27.	" " " "	1	1	67	67
" " 28.	" " " "	1	1	67	67
Standard, 100 feet opening.	" " " "	1	1	106	106
" 150 " " (Deck).	" " " "	1	1	157	157
" 150 " " (Through).	" " " "	1	1	157	157
French Broad River, N. C.	Western North Carolina R. R.	1	1	268	268
Staunton River, Va.	Richmond and Danville R. R.	4	1	606	606
Blackstone Canal, Mass.	New York and New England R. R.	1	2	122	244
Morrisville, Pa.	Philadelphia and Trenton R. R.	4	2	228	456

RAILROAD BRIDGES.

IRON TRUSSES.—Continued.

LOCATION.	OWNER.	No. of Spans.	No. of Tracks.	Total Length.	Total Length Single Track.
				Feet.	Feet.
Pennypack Creek	Philadelphia and Trenton R. R.	2	2	194	388
Monongahela River, Port Perry, Pa.	Pittsburg, Virginia and Charleston R. R.	12	1	1640	1640
" " Brownsville, Pa.	" " " "	4	1	781	781
Susquehanna River, Harrisburg, Pa.	Pennsylvania R. R.	23	2	3680	7360
Downingtown, Pa.	" "	3	2	260	520
Raritan River, New Brunswick, N. J.	New Jersey R. R.	7	2	880	1760
Bridge No. 27, north of Baltimore, Md.	Northern Central Railway	1	2	140	280
" " 28, " " "	" " "	1	2	130	260
" " 34, " " "	" " "	1	2	68	136
" " 123, " York, Pa.	" " "	1	1	93	93
" " 136, " " "	" " "	1	1	148	148
Little Juniata, No. 1, west of Spruce Creek, Pa.	Pennsylvania R. R.	3	2	260	520
" " " 2, " " "	" "	2	2	173	346
" " " 3, " " "	" "	3	2	258	516
" " " 6, " " "	" "	3	2	258	516
Middletown Canal Bridge, Middletown, Pa.	" "	1	2	121	242
Schuylkill River, Philadelphia, Pa.	" "	3	3	464	1392
Bridge over Thirtieth Street, Elevated R. R., Philadelphia.	" "	1	3	75	225
Canal, Wrightsville, Pa.	" "	1	2	83	166
Big Pautuxent, south of Baltimore, Md.	Baltimore and Potomac R. R.	2	2	300	600
Patapsco River, " " "	" " " "	4	2	565	1130
Little Pautuxent.	" " " "	1	2	181	362
Ridley Creek	Philadelphia, Wilmington and Baltimore R. R.	1	2	142	284
Bolivar, Pa.	West Pennsylvania R. R.	3	1	362	362
Salina	" " "	3	2	418	836
Morris Canal	Belvidere Delaware R. R.	1	2	104	208
Bridge over Philadelphia and Reading R.R., Philadelphia, Pa.	Philadelphia, Germantown and Chestnut Hill R. R.	1	2	116	232
Delaware River, Trenton, N. J.	Trenton Delaware Bridge Co.	5	2	1030	2060
Big Conestoga Creek	Pennsylvania R. R.	3	2	328	656
Coatesville, Pa.	" "	6	2	836	1672
Mayes River, near Huntingdon, Pa.	" "	5	2	640	1280
Little Juniata, No. 5	" "	2	2	171	342
" " " 7	" "	1	2	98	196
" " " 10	" "	2	2	174	348
Bridge over Conemaugh, at Johnstown, Pa.	" "	5	2	383	766
Summerhill Bridge	" "	3	2	245	490
Vandevander's Bridge	" "	5	2	512	1024
Turtle Creek "	" "	1	2	111	222
Garver's "	" "	5	2	642	1284
Shaver's Creek "	" "	1	2	78	156
Bridge over Thirtieth St., north of Market St., Philadelphia.	" "	1	6	65	390
Mount Union Bridge, over Juniata River, Pa.	" "	4	2	502	1004
Fiftieth Street Bridge, Philadelphia.	" "	1	5	78	390
East Span Monongahela River Bridge, Pittsburg, Pa.	Pittsburg, Cincinnati and St. Louis Railway	1	2	185	370
Bailey's Bridge	" " " " "	1	2	90	180

RAILROAD BRIDGES.

PLATE GIRDERS.

LOCATION.	OWNER.	No. of Spans.	No. of Tracks.	Total Length.	Total Length Single Track.
				Feet.	Feet.
Thirty-fifth Street, Philadelphia, Pa	Pennsylvania R. R	3	7	77	539
Schalk's Farm, N. J	Trenton Branch U. N. J. R. and C. Co	1	2	25	50
Shuman's, west of Huntingdon, Pa	Pennsylvania R. R	6	2	310	620
Bear Road, Pa	" "	1	4	22	88
Rockville Canal, near Harrisburg, Pa	" "	2	2	126	252
Brunswick Street, Jersey City, N. J	New Jersey R. R	1	2	29	58
Approach Raritan River Bridge, New Brunswick, N. J	" " "	17	2	445	890
Neshaminy Creek, Pa	Philadelphia and Trenton R. R	4	2	282	564
Bridge No. 23, north of Baltimore, Md	Northern Central Railway	1	2	54	108
" " 32, " " "	" " "	1	2	60	120
" " 33, " " "	" " "	1	2	67	134
" " 36, " " "	" " "	1	2	33	66
" " 37, " " "	" " "	1	2	68	136
" " 39, " " "	" " "	1	2	82	164
" " 46, " " "	" " "	1	2	33	66
" " 57, " " "	" " "	1	2	40	80
" " 58, " " "	" " "	2	2	61	122
" " 84, " " "	" " "	5	2	172	344
" " 95, " " "	" " "	3	2	73	146
" " 116, " " "	" " "	1	1	56	56
" " 149, " " "	" " "	1	2	30	60
" " 159, " " "	" " "	3	2	175	350
James Street, Belvidere, N. J	Belvidere Delaware R. R	3	1	54	54
North Water Street, Belvidere, N. J	" " "	3	1	59	59
South " " " "	" " "	1	1	29	29
Rogue's Harbor, south of Baltimore, Md	Baltimore and Potomac R. R	1	2	55	110
Herbert's Run, " " "	" " "	1	2	71	142
Gwynn's " near Baltimore, Md	" " "	1	2	45	90
Beaver Dam	" " "	1	2	70	140
Bridge over Grove Street, Jersey City, N. J	Harsimus Branch Pennsylvania R. R	1	2	68	136
" Henderson Street, " "	" " " "	1	2	68	136
" Jersey Avenue, " "	" " " "	1	2	90	180
" Cole Street, " "	" " " "	1	2	69	138
" Monmouth Street, " "	" " " "	1	2	69	138
" Erie Street, " "	" " " "	1	2	69	138
Coleman's Run, N. J	Trenton Branch U. N. J. R. and C. Co	1	4	82	128
Canal, west of Middletown, Pa	Pennsylvania R. R	1	2	84	168
Juniata Creek, Duncannon, Pa	" "	3	2	125	250
East Approach Schuylkill River Bridge, Philadelphia	" "	30	3	1497	4491
West " " " " "	" "	14	3	646	1938
Rahway, N. J	New Jersey R. R	1	4	19	76
" Creek, N. J	" " "	6	4	260	1040
Approach to Little Juniata, No. 1	Pennsylvania R. R	1	2	45	90
Bridge over Fifteenth Street, Philadelphia, Pa	" "	1	8	53	424

RAILROAD BRIDGES.

PLATE GIRDERS.—Continued.

LOCATION.	OWNER.	No. of Spans.	No. of Tracks.	Total Length.	Total Length Single Track.
				Feet.	*Feet.*
Bridge over Sixteenth Street, Philadelphia, Pa	Pennsylvania R. R.	1	10	55	550
Pohatcong Road, N. J.	Belvidere Delaware R. R.	3	1	70	70
Andover Furnace, "	" " "	1	1	25	25
Alexauken Creek, "	" " "	2	1	98	98
Pequest " "	" " "	3	1	158	158
Bridge No. 31, at Hoffman's, N. J.	" " "	2	1	110	110
Assanpink, No. 1, N. J.	" " "	1	2	65	130
" " 3, "	" " "	2	2	99	198
Paul Street, Belvidere, N. J.	" " "	3	1	76	76
Bridge over Delaware Extension Pennsylvania R. R., Phila.	Pennsylvania R. R.	5	2	190	380
" Fifty-second Street, Philadelphia	" "	1	5	55	275
Hollidaysburg, Pa.	" "	2	2	104	208
Juniata Street, Tyrone, Pa.	" "	1	1	66	66
Bridge for Fourth Track, Ardmore, Pa.	" "	1	1	29	29
" " " Litzenberg, Pa.	" "	1	1	27	27
" " " Haverford Station, Pa.	" "	1	1	27	27
" " " No. 28, Pa.	" "	1	1	28	28
" " " County Line, Pa.	" "	1	1	28	28
Braddock's Crossing, Pa.	" "	2	2	57	114
Strickler's, Pa.	" "	1	4	66	264
Wolf's, Pa.	" "	1	4	28	112
Bridge over York Avenue, Philadelphia	Connecting Railway	1	4	76	304
Germantown Junction, "	" "	1	2	74	148
Bridge over Broad Street, "	" "	3	4	142	568
" Poplar " "	" "	3	2	120	240
" Girard Avenue, " (Approaches)	" "	2	2	26	52
Rock Run	Columbia and Port Deposit R. R.	1	1	36	36
Approaches to Manayunk Bridge	Pennsylvania Schuylkill Valley R. R.	5	2	355	710
Bridge over Wynnefield Avenue, Philadelphia	" " " "	3	2	106	212
" Jefferson Street, Philadelphia	" " " "	3	2	76	152
Germantown Junction, Philadelphia	Philadelphia, Germantown and Chestnut Hill R. R.	1	2	79	158
Bridge over Sixteenth Street, Philadelphia	" " " " "	3	2	115	230
" Phila. and Reading R. R., Phila. (Approaches)	" " " " "	10	2	257	514
" Twenty-first Street, Philadelphia	" " " " "	3	2	69	138
" Twenty-second Street, "	" " " " "	3	2	122	244
" Richmond Branch of Phila. and Reading R. R.	" " " " "	1	2	74	148
" Rittenhouse Street, Germantown, Pa.	" " " " "	1	2	57	114
" Harvey " " "	" " " " "	1	2	58	116
" Green " " "	" " " " "	3	2	81	162
" Carpenter " " "	" " " " "	3	2	74	148
" Mount Pleasant Avenue, " "	" " " " "	1	2	64	128
Cresheim Creek Crossing	" " " " "	13	2	484	868
Bridge over Union Avenue, Germantown, Pa.	" " " " "	1	2	60	120
Tacony Street, Philadelphia	Philadelphia and Trenton R. R.	3	5	68	252

RAILROAD BRIDGES.

PLATE GIRDERS.—Continued.

LOCATION.	OWNER.	No. of Spans.	No. of Tracks.	Total Length.	Total Length Single Track.
				Feet.	Feet.
Big Chiques, Pa.	Pennsylvania R. R.	4	2	287	287
Little " "	" "	2	2	141	141
Brandywine Creek, Del	Philadelphia, Wilmington and Baltimore R. R.	3	2	150	300
Bristol Canal Bridge, Pa.	Philadelphia and Trenton R. R.	1	4	87	348
" Mill Race, "	" " "	1	4	40	160
Bridge over Sutherland Avenue, Philadelphia	Pennsylvania R. R.	1	1	80	80
" Beach Creek, Clearfield and S. W. R. R.	Bald Eagle Valley R. R.	1	2	28	56
" Gay Street, Baltimore, Md.	Union R. R.	1	2	56	112
" Philadelphia Pike, Baltimore, Md.	" "	1	2	72	144
" Broadway, Baltimore, Md.	" "	3	2	139	278
Mount Clare Approach to Phœnixville Bridge	Pennsylvania Schuylkill Valley R. R.	1	2	74	148
Bridge over Fountain Street	" " " "	1	2	47	94
" Parker "	" " " "	1	2	56	112
" Main " Phœnixville	" " " "	2	2	103	206
" Lancaster Road	" " " "	1	2	66	132
" Furnace Street, Birdsboro'	" " " "	1	2	63	126
" Cinder " "	" " " "	1	2	46	92
" Franklin " Reading	" " " "	1	2	80	160
" " Avenue, Norristown	" " " "	1	2	36	72
Approach to Schuylkill River Bridge, Reading	" " " "	1	2	60	120
" Little Dam Bridge	" " " "	1	2	82	164
" Poplar Neck "	" " " "	1	2	67	134
Bridge over Wilmington and Northern R. R., near Naomi, Pa.	" " " "	1	2	73	146
" Thirty-fifth Street, Philadelphia	Junction R. R.	3	1	78	78
" Park Drive, Philadelphia	" "	1	3	33	99
" Landsdowne Drive, Philadelphia	" "	1	2	79	158
Bridge No. 1	Mexican National Construction Co.	1	1	29	29
" " 2	" " " "	1	1	33	33
" " 12	" " " "	1	1	54	54
" " 13	" " " "	1	1	49	49
" " 14	" " " "	1	1	49	49
" " 33	" " " "	1	1	34	34
Standard, 15 feet opening	" " " "	1	1	19	19
" 26 " "	" " " "	1	1	29	29
" 30 " "	" " " "	1	1	33	33
" 50 " "	" " " "	1	1	54	54
Near Phillipsburg, N. J.	Belvidere Delaware R. R.	1	2	27	54
Near Marshall, Texas	Texas and Pacific R. R	1	1	54	54
Over Haverford Street, Philadelphia	Pennsylvania R. R.	1	8	57	456
Near Fifty-second Street, "	" "	1	2	36	72
Bridge No. 4, Little Juniata, west of Spruce Creek, Pa.	" "	5	2	267	534
Little Conestoga.	" "	1	2	66	132
Conewago	" "	3	2	119	238
Conemaugh	" "	2	2	132	264

RAILROAD BRIDGES.

PLATE GIRDERS. Continued.

LOCATION.	OWNER.	No. of Spans.	No. of Tracks.	Total Length.	Total Length Single Track.
				Feet.	Feet.
Mayes Canal Bridge, near Harrisburg, Pa.	Pennsylvania R. R.	1	2	75	150
Paxton Creek, near Harrisburg, Pa.	" "	1	4	48	192
Metuchen, N. J., over Road	New Jersey R. R.	1	4	36	144
" " " Easton and Amboy R. R.	" " "	1	4	37	148
Little Conestoga (Mount Joy Line)	Pennsylvania R. R.	1	1	41	41
Morgan's Corner	" "	1	2	37	74
Bridge over Richmond Branch Phila. and Reading R.R., Phila.	Connecting Railway	1	2	55	110
Extension of Bridge on Try Street, Pittsburg, Pa.	Pittsburg, Cincinnati and St. Louis Railway	3	2	196	392

RAILROAD BRIDGES.

WOODEN TRUSSES.

LOCATION.	OWNER.	No. of Spans.	No. of Tracks.	Total Length.	Total Length Single Track.
				Feet.	Feet.
Driftwood, Pa.	B. B. Extension Allegheny Valley R. R.	2	2	300	600
West of Driftwood, Pa.	" " " " "	2	2	325	625
Mix's Run, Pa.	" " " " "	1	1	84	84
Barr's " "	" " " " "	1	1	84	84
Meadic's Run, Pa.	" " " " "	1	1	88	88
Laurel " "	" " " " "	1	1	77	77
East of Weedville Cut	" " " " "	1	2	120	240
West of " "	" " " " "	2	2	152	304
Falls Creek	" " " " "	1	2	78	156
Bridge No. 1, Middle Division	" " " " "	2	1	142	142
" 2, " "	" " " " "	2	2	175	350
" 3, " "	" " " " "	2	2	155	310
" 4, " "	" " " " "	3	2	230	460
" 5, " "	" " " " "	3	2	220	440
" 6, " "	" " " " "	3	2	240	480
" 6½, " "	" " " " "	1	1	57	57
" 7, " "	" " " " "	2	2	175	350
" 8, " "	" " " " "	3	2	270	540
" 8½, " "	" " " " "	1	1	68	68
" 9, " "	" " " " "	2	2	175	350
" 10, " "	" " " " "	3	1	216	216
" 11, " "	" " " " "	3	1	245	245
" 12, " "	" " " " "	3	1	265	265
" 13, " "	" " " " "	3	1	216	216
Beaver Run	" " " " "	1	1	57	57

RAILROAD BRIDGES.

WOODEN TRUSSES.—Continued.

LOCATION.	OWNER.	No. of Spans.	No. of Tracks.	Total Length.	Total Length Single Track.
				Feet.	Feet.
Robinson's Loop	B. B. Extension Allegheny Valley R. R.	3	1	218	218
Pine Run	" " " " "	1	1	57	57
Indiantown Run	" " " " "	1	1	57	57
New Bethlehem, Bostonia Branch	" " " " "	1	1	190	190
Leatherwood Run	" " " " "	1	1	57	57
Mortimer "	" " " " "	1	1	68	68
Little Bald Eagle Creek	Tyrone Branch Pennsylvania R. R.	2	1	108	108
Osceola Dam	T. and C. R. R.	1	1	74	74
Bridge No. 7	Tyrone Branch Pennsylvania R. R.	2	1	114	114
Beaver Run	West Pennsylvania R. R.	2	1	207	207
Near Hollidaysburg	Pennsylvania R. R.	1	1	88	88
Beaver Creek	Moshannon Coal Co.	1	1	55	55
Near Hollidaysburg	Pennsylvania R. R.	2	1	145	145
Flemington Bridge	Bald Eagle Valley R. R.	3	1	246	246
Juniata River	Morrison's Cove Branch R. R.	2	1	215	215
Bridge No. 1	" " "	1	1	116	116
Piney Creek	Williamsburg Branch	1	1	86	86
West Branch Susquehanna River	Curwensville Extension T. and C. Railway	2	1	295	295
Nanticoke, Pa., over North Branch Susquehanna		5	1	765	765
Rockton Run	P. and E. R. R.	1	1	72	72
Bridge No. 12	N. C. Railway	3	1	291	291
" 2, Frederick Division	Pennsylvania R. R.	1	1	97	97
" 6, " "	" "	1	1	87	87
" 7, " "	" "	1	1	88	88
" 9, " "	" "	1	1	67	67
" 14, " "	" "	1	1	66	66
" 15, " "	" "	2	1	51	51
Codorus Creek, " "	" "	2	1	218	218
Jacob's " " "	" "	1	1	41	41
Holmesburg Turnpike, Bustleton Branch	" "	1	1	50	50
Kinton's Knob, Bedford Division	" "	1	1	152	152
Bridge No. 52, near Flemington, N. J	Belvidere Delaware R. R.	1	1	42	42
" 54, " " "	" " "	1	1	42	42
" 60, " " "	" " "	1	1	42	42
Neabsco	Alexandria and Fredericksburg R. R.	1	1	91	91
Long Bridge, Washington, D.C.	" " " "	2	1	167	167
Occoquan Creek	" " " "	4	1	608	608
Bridge No. 1, Redstone Branch	Pittsburg, Virginia and Charleston Railway	1	1	108	108
" 2, " "	" " " " "	1	1	132	132
" 3, " "	" " " " "	1	1	132	132
" 4, " "	" " " " "	1	1	132	132
" 5, " "	" " " " "	1	1	132	132
" 6, " "	" " " " "	1	1	88	88
" 7, " "	" " " " "	1	1	88	88

RAILROAD BRIDGES.

WOODEN TRUSSES.—Continued.

LOCATION.	OWNER.	No. of Spans.	No. of Tracks.	Total Length.	Total Length Single Track.
				Feet.	*Feet.*
Bridge No. 8, Redstone Branch	Pittsburg, Virginia and Charleston Railway	1	1	88	88
" 9, " "	" " " "	1	1	88	88
Bridge over Newark Avenue, Jersey City, N. J	Pennsylvania R. R.	1	2	130	260
Jamestown, Bedford Division	" "	1	1	32	32
Indiana, Indiana Branch	West Pennsylvania R. R.	1	1	24	24
Falls Creek	Ridgway and Clearfield R. R.	1	1	112	112
Conowingo	Columbia and Port Deposit R. R.	1	1	98	98
South Amboy, N. J	Camden and Amboy R. R.	1	1	48	48
Catawissa Creek, Pa	North and West Branch Railway	2	1	255	255
Nescopec " "	" " " "	1	1	125	125
Big Wapwallopen Creek, Pa	" " " "	1	1	60	60
Little " " "	" " " "	1	1	80	80
Solomon's Creek, Pa	" " " "	1	1	109	109
Nanticoke " "	" " " "	1	1	92	92
" Basin, "	" " " "	2	2	125	250
Near Fall Brook, "	Fall Brook Coal Co.	1	1	156	156
" Ramsey's, "	Jersey Shore, Pine Creek and Buffalo Railway	2	1	316	316
" Tomb's Run, Pa	" " " "	3	1	402	402
" Tioga, Pa	" " " "	2	1	212	212
Near Camden, N. J	Camden, Gloucester and Mount Ephraim Railway		1	200	200
	Buffalo, Pittsburg and Western R. R.		1	50	50

RAILROAD DRAWBRIDGES.

WOOD AND IRON.

LOCATION.	OWNER.	KIND OF BRIDGE.	No. of Tracks.	Total Length.	Total Length Single Track
				Feet.	*Feet.*
Raritan River, New Brunswick, N. J	New Jersey R. R.	Triangular Truss	2	155	310
Willow Street, Trenton, N. J	Belvidere Delaware R. R.	Jack-Knife Draw	1	52	52
Dickerson's, " "	" " "	Plate Girder	1	79	79
Aramingo Canal, Philadelphia	Pennsylvania R. R.	Pratt Truss	2	120	240
Coalport	Belvidere Delaware R. R.	Modified Pratt Truss	1	129	129
Draw Span Bridge, Arsenal, Philadelphia	Pennsylvania R. R.	Pratt Truss	1	192	192
Brookville	Belvidere Delaware R. R.	Howe "	1	91	91
Hackensack River, N. J	New Jersey R. R.	" "	2	168	336
Barnegat Bay, N. J	Philadelphia and Long Branch R. R.	" "	1	169	169
Wire Mill, Trenton, N. J	Belvidere Delaware R. R.	"A" Trusses	1	102	102
Atlantic City, N. J	West Jersey R. R.	Howe Truss	1	100	100
Bridge over Canal, near Princeton, N. J	Pennsylvania R. R.	Trussed Girder	1	72	72

HIGHWAY BRIDGES.

IRON.

LOCATION.	OWNER.	STYLE OF BRIDGE.	No. of Spans.	Total Length.
				Feet.
Over Pennsylvania R. R. at Forty-first Street, Philadelphia	City of Philadelphia	Stiffened Triangular Truss	1	220
" " " Fortieth " "	" "	Ordish Suspension	3	335
" " " Belmont Avenue, "	" "	Rolled Beams	5	148
" Connecting Railway at Ridge " "	" "	Plate Girder	1	63
" " " Park " "	" "	" "	1	78
" " " Columbia " "	" "	" "	1	70
Market Street Bridge over Thirtieth Street, "	" "	" "	1	64
State Street Bridge, Harrisburg, over Pennsylvania R. R.	" Harrisburg	Pratt Truss	1	160
" " " " Canal	" "	" "	1	130
Three Bridges over Pennsylvania R. R. at Parkesburg	" "	" "	1	150
Penn Avenue Bridge, Pittsburg, over Pennsylvania R. R.	" Pittsburg	" "	1	84
Ellsworth Avenue Bridge, Pittsburg, over Pennsylvania R. R.	" "	" "	1	190
Hiland " " " " " "	" "	" "	1	76
Shady Lane Bridge, Pittsburg, over Pennsylvania R. R.	" "	" "	1	82
Hospital Street Bridge, " " " "	" "	Plate Girders and Truss	5	311
Bridge over Pennsylvania R. R., Overbrook, Pa	Pennsylvania R. R.	Iron Trestle and Trusses	7	287
" " " Villanova, Pa	" "	" " "	1	50
" " " Paoli, Pa	" "	Lattice Girder	1	65
" " " Lime Street, Lancaster	" "	" "	1	33
" " " Biddle's Lane, near Paoli	" "	" "	1	66
" " " Bryn Mawr, Pa	" "	Braced Arch	1	70
" " " East Liberty, Pa	" "	Lattice Girder	1	92
Altoona Foot Bridge	" "	Rolled Beams	14	426
Bryn Mawr Foot Bridge	" "	" "	1	55
Bridge over Water Street, Philadelphia	" "	Lattice Girder	1	55
" New Jersey R. R., Waldo Avenue, Jersey City	Jersey City	Pratt Truss	1	128
" " " Chestnut " "	"	" "	1	85
Plank Road Bridge, near Hackensack, N. J	New York, Ontario and Western Railway	Plate Girder	1	67
Queen Street, Germantown	Phila., Germantown and Chestnut Hill R. R.	Rolled Beams	1	36
School Lane, "	" " " " "	" "	1	35
Walnut " "	" " " " "	" "	1	35
Allen's " "	" " " " "	" "	1	36
Neshaminy Creek, near Bristol, Pa	Bucks County Commissioners	Triangular Truss	3	375
Shrewsbury River, near Sea Girt, N. J	Jumping Point Bridge Co	Iron Trestle and Draw Span	21	560

AQUEDUCTS.

LOCATION.	OWNER.	STYLE OF BRIDGE.	No. of Spans.	Total Length.
				Feet.
Over Pine Creek, Pa	Pennsylvania Canal Co	Iron Trusses	8	290
Over Philadelphia and Trenton R. R., Trenton, N. J	Delaware and Raritan Canal	" "	1	42

HIGHWAY BRIDGES.

WOOD.

LOCATION.	OWNER.	STYLE OF BRIDGE.	No. of Spans.	Total Length.
				Feet.
Over Schuylkill River, at Market Street, Philadelphia	City of Philadelphia	Howe Truss	3	554
Green Island, Lake George, N. Y	Sagamore Hotel Co	Rustic Trussed Girders	3	130
Plainsboro' Road, N. J	Trenton Branch U. N. J. R. and C. Co	Howe Truss	1	75
Mountville, Pa	Pennsylvania R R	" "	1	60
Near Irwin Station, Pa	" "	" "	1	63
Over Duquesne Street, Pittsburg	" "	" "	1	65
Near Harrisburg, Pa	Henry Clay Furnace Co	" "	2	95
" Westville, N. J., over Big Timber Creek	Gloucester Turnpike Co	Trestle and "A" Truss	15	245

Railroad Bridges	104,343 feet =	19.76 miles.
Highway "	6,126 " =	1.16 "
Total		20.92 miles.

Engineering Department.

RAILROADS.

We are prepared to make experimental surveys and locations of railroad lines, and to supervise the construction of railroads, including the designing of terminal arrangements, freight and passenger stations, shops, and all other railroad buildings and appliances. We will act as consulting engineers in any department of railroad engineering, including examinations of, and reports on, existing lines.

Having been extensively connected with the elevated railways in the cities of New York and Philadelphia, and having studied carefully the cable system of street railways now being largely introduced in our principal cities, we offer our services to parties interested in the subject of rapid transit in cities.

MUNICIPAL ENGINEERING, WATER-WORKS, SEWERAGE, Etc.

We will act as engineers for projected towns, adapting the plot to the topographical features of the site, so as to provide for the contingencies of drainage, water supply, lighting, etc. Also will make examinations of, and report on, proposed water-works and sewerage systems, furnish plans for same, and supervise their construction. We will make special reports on the commercial value of water-works already built, or proposed, in which capitalists may be thinking of investing. This department of our business was organized June 1, 1884, at which time we secured the services of Mr. Chas. G. Darrach, who had been for some ten years principal assistant engineer of the Philadelphia Water Department, a service which includes eight distinct systems of water-works of different types, and which, so far as variety of work and experience goes, is not equalled by any other city in the world excepting London. Since the organization of this department we have examined and reported on work to the value of over one million dollars, have constructed complete one set of municipal water-works, and have several others in progress.

EXPERT WORK.

The list which we give of cases in which the several members of our firm have been consulted as experts will indicate the classes of work with which we have been brought in contact. Controversies are continually arising with railroad companies, individuals, and others, oftentimes involving litigation, in which it is desirable to secure the services of those who have had experience in such matters, and who understand how to prepare cases for trial in court, as well as to give advice in private consultations.

BRIDGES.

We are in a position to furnish plans and specifications for bridges of any kind, for railways, highways, etc., and having prepared engineers' plans for such bridges, will, if desired by our clients, arrange contracts for their construction

by responsible and well-known bridge-builders, and supervise their manufacture and erection.

We are not manufacturers or builders, but act strictly in a professional capacity as engineers, thus following out the rule which we have adopted of keeping the professional business of the engineer distinct from the mechanical business of the builder or contractor.

Our practice is to obtain proposals, for structures in our charge, on *our own* plans and specifications, from the leading bridge-building firms of the country, which proposals are submitted to our clients, who decide on the contracts to be awarded, we carrying out their instructions relative thereto.

We do not profess to build *cheap* bridges; but we *do* claim that our bridges are properly proportioned to bear the duty imposed upon them, that their details are carefully worked out in accordance with the most approved practice, and that they can be constructed as cheaply *per pound of material in them* as those of any other competent designers, no more weight of material being put in them than is necessary to obtain the results intended. The tendency everywhere is in the direction of a continual increase in the weight of locomotives and rolling stock, and in the speed of moving loads. While we can, under positive instructions from our clients, design bridges for light service or with a low factor of safety and cheap arrangement of details, thus reducing the weights of the structures per running foot, when the matter is left to our discretion we adopt a high standard.

Our daily experience for twenty-five years, in the maintenance of bridges on some of the most prominent railroads in the United States, enables us to form an opinion (better than they can who only build bridges and have no direct responsibility for them afterwards) as to what are the advanced requirements of the age, and the contingencies to be met with in the actual service of structures, and we cannot, with this experience, recommend the adoption of a low standard for the sake of a small saving in the first cost of construction, knowing that it must result afterwards only in dissatisfaction, continual annoyance, and an undue enlargement of operating expenses.

Should parties, however, prefer obtaining bids from manufacturers on their designs, made on specifications prepared by us to suit the requirements of the case, we are in a position to act as experts in such cases, and will attend to all the details in the matter, prepare the specifications, conditions for bidding, etc., and give a professional opinion on the merits of the plans submitted and their compliance with the specifications.

For railway bridges up to 80 feet span we recommend the use of plate girders; for longer spans in ordinary cases we would advise open trusses, such as the triangular trusses in the Pennsylvania Railroad bridge across the Susquehanna River, six miles west of Harrisburg, and the bridge over the Schuylkill River in Philadelphia, on the Filbert Street (Pennsylvania Railroad) elevated road, or a modified form of Pratt truss, like that at Manayunk, over the Schuylkill River, Pennsylvania Schuylkill Valley Railroad. (See illustrations.) In special cases these designs need to be modified to suit local requirements, and circumstances sometimes arise requiring a special type of structure involving the cantilever or suspension principle, etc.

In the absence of local circumstances necessitating modifications, or of definite instructions from a client to the contrary, we design our iron bridge superstructure in accordance with the annexed general specification, which is the same as framed by us for Pennsylvania Railroad standard.

Where parties so desire, we will design the masonry for bridges, and supervise the construction of foundations, piers, and abutments.

Accompanying will be found a number of views of various bridges constructed from our plans, which will serve to indicate the different types we have used for various purposes.

DATA TO BE FURNISHED BY PARTIES ORDERING BRIDGE PLANS.

Parties desiring to order plans for bridges should furnish the following data:

Location for proposed structure.

Material to be used,—wood, iron, or stone.

Purpose for which bridge is to be used, *i.e.*, railroad, highway, etc.

RAILROAD BRIDGES.

MASONRY.

Number of spans.

Alignment of road, and, if on curve, data for plotting the same.

Location of piers and abutments (if already fixed), and outline of masonry, showing angle and direction of askew, if any.

Clear spans on centre line of road, with widths and lengths of bridge seats on piers and abutments, all measured *under* coping of masonry. If bridge is on a curve, give distances for each span on chord and not on curve.

State whether floor system is to be carried on upper or lower chord, and note any special arrangement that may be required by local circumstances.

Height from top of masonry (bridge seat) to base of rail. (This should be fixed in consultation with us whenever possible.)

Height from water or ground underneath to base of rail.

Location of high and low water-marks, and if the bridge is to be over a road or railroad, give the clearance height required for the same.

If possible, furnish map and profile of centre line, which will answer many of these inquiries.

If it is desired that we shall prepare the plans of the masonry, state any requirements that must be fulfilled in working up the design for same; also give profile showing bottom of stream and character of foundations. All dimensions to be marked on plan and profile clearly, in figures, so as not to have to trust to scale measurements.

SUPERSTRUCTURE.

Number of tracks.

Gauge of road.

Clearance required in width and height.

Character of travel, class of engines used, with diagram of wheel loads. (If several classes are used, give each.)

Style of floor system required, with kind of material to be used in floor girders.

HIGHWAY BRIDGES.

MASONRY.

The same data is required for masonry as above stated under heading of Railroad Bridges.

SUPERSTRUCTURE.

Number of roadways required, with width of each in clear.

Number of footways required, with width of each in clear.

Kind of traffic, and whether in city or country.

Kind of flooring desired; also kind of material wanted in floor girders.

If bridge is to replace one now in use, furnish general dimensions and description of existing structure.

State if owner will furnish false works for erection, flooring timber, etc., and whether he will do the erection and painting or not.

IRON STRUCTURE ON PENNSYLVANIA R. R. CO.'S ELEVATED RAIL ROAD, FILBERT STREET, PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

PHOTO-GELATYPE WELLS & HOPE CO. PHILADELPHIA

FREIGHT CAR SHOPS OF UNITED STATES ROLLING STOCK CO., AT HEGEWISCH, ILLINOIS,
IN PROGRESS OF CONSTRUCTION.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

PHOTO-COLLOTYPE WELLS & HOPE CO. PHILADELPHIA

TRAIN SHED OF PENNSYLVANIA RAIL ROAD CO.'S BROAD STREET PASSENGER STATION, PHILADELPHIA.
VIEW TAKEN DURING CONSTRUCTION.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

HIGHWAY BRIDGES.

IRON.

LOCATION.	OWNER.	STYLE OF BRIDGE.	No. of Spans.	Total Length.
				Feet.
Over Pennsylvania R. R. at Forty-first Street, Philadelphia	City of Philadelphia	Stiffened Triangular Truss	1	220
" " " Fortieth " "	" "	Ordish Suspension	3	335
" " " Belmont Avenue, "	" "	Rolled Beams	5	148
" Connecting Railway at Ridge " "	" "	Plate Girder	1	63
" " " Park " "	" "	" "	1	78
" " " Columbia " "	" "	" "	1	70
Market Street Bridge over Thirtieth Street, "	" "	" "	1	64
State Street Bridge, Harrisburg, over Pennsylvania R. R.	" Harrisburg	Pratt Truss	1	160
" " " " Canal	" "	" "	1	130
Three Bridges over Pennsylvania R. R. at Parkesburg	" "	" "	1	150
Penn Avenue Bridge, Pittsburg, over Pennsylvania R. R.	" Pittsburg	" "	1	84
Ellsworth Avenue Bridge, Pittsburg, over Pennsylvania R. R.	" "	" "	1	190
Hiland " " " " " "	" "	" "	1	76
Shady Lane Bridge, Pittsburg, over Pennsylvania R. R.	" "	" "	1	82
Hospital Street Bridge, " " " "	" "	Plate Girders and Truss	5	311
Bridge over Pennsylvania R. R., Overbrook, Pa	Pennsylvania R. R.	Iron Trestle and Trusses	7	287
" " " Villanova, Pa	" "	" " "	1	50
" " " Paoli, Pa	" "	Lattice Girder	1	65
" " " Lime Street, Lancaster	" "	" "	1	33
" " " Biddle's Lane, near Paoli	" "	" "	1	66
" " " Bryn Mawr, Pa	" "	Braced Arch	1	70
" " " East Liberty, Pa	" "	Lattice Girder	1	92
Altoona Foot Bridge	" "	Rolled Beams	14	426
Bryn Mawr Foot Bridge	" "	" "	1	55
Bridge over Water Street, Philadelphia	" "	Lattice Girder	1	55
" New Jersey R. R., Waldo Avenue, Jersey City	Jersey City	Pratt Truss	1	128
" " " Chestnut " "	"	" "	1	85
Plank Road Bridge, near Hackensack, N. J	New York, Ontario and Western Railway	Plate Girder	1	67
Queen Street, Germantown	Phila., Germantown and Chestnut Hill R. R.	Rolled Beams	1	36
School Lane, "	" " " " "	" "	1	35
Walnut " "	" " " " "	" "	1	35
Allen's " "	" " " " "	" "	1	36
Neshaminy Creek, near Bristol, Pa	Bucks County Commissioners	Triangular Truss	3	375
Shrewsbury River, near Sea Girt, N. J	Jumping Point Bridge Co	Iron Trestle and Draw Span	21	560

AQUEDUCTS.

LOCATION.	OWNER.	STYLE OF BRIDGE.	No. of Spans.	Total Length.
				Feet.
Over Pine Creek, Pa	Pennsylvania Canal Co	Iron Trusses	3	290
Over Philadelphia and Trenton R. R., Trenton, N. J	Delaware and Raritan Canal	" "	1	42

HIGHWAY BRIDGES.

WOOD.

LOCATION.	OWNER.	STYLE OF BRIDGE.	No. of Spans.	Total Length.
				Feet.
Over Schuylkill River, at Market Street, Philadelphia	City of Philadelphia	Howe Truss	3	554
Green Island, Lake George, N. Y	Sagamore Hotel Co	Rustic Trussed Girders	3	130
Plainsboro' Road, N. J	Trenton Branch U. N. J. R. and C. Co	Howe Truss	1	75
Mountville, Pa	Pennsylvania R R	" "	1	60
Near Irwin Station, Pa	" "	" "	1	63
Over Duquesne Street, Pittsburg	" "	" "	1	65
Near Harrisburg, Pa	Henry Clay Furnace Co	" "	2	95
" Westville, N. J., over Big Timber Creek	Gloucester Turnpike Co	Trestle and "A" Truss	15	245

Railroad Bridges	104,343 feet =	19.76 miles.
Highway "	6,126 " =	1.16 "
Total		20.92 miles.

PHOTO-CULLOTYPE WELLS & HOPE CO. PHILADELPHIA

IRON BRIDGE OVER SUSQUEHANNA RIVER ON MAIN LINE OF PENNSYLVANIA RAILROAD,
SIX MILES WEST OF HARRISBURG, PENNA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

BRIDGE OVER PENNSYLVANIA RAIL ROAD AT 40th STREET, PHILADELPHIA.

WILSON BROTHERS & Co.
Civil Engineers and Architects
PHILADELPHIA, Pa.

PHOTO-CELLOTYPE WELLS & HOPE CO. PHILADELPHIA

BRIDGE OVER PENNSYLVANIA RAIL ROAD AT 41st STREET, PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

PENNSYLVANIA RAIL ROAD COMPANY'S BRIDGE OVER SCHUYLKILL RIVER ON FILBERT STREET ELEVATED RAIL ROAD, PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

PENNSYLVANIA R. R. CO.'S BRIDGE OVER 30th STREET, PHILADELPHIA, AT ENTRANCE TO GRAIN WAREHOUSE.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

PENNSYLVANIA RAIL ROAD BRIDGE OVER DELAWARE RIVER AT TRENTON, NEW JERSEY.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

MAYLINSVILLE BRIDGE, JUNCTION RAILROAD, PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

PATAPSCO BRIDGE, BALTIMORE & POTOMAC R. R., MARYLAND.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

BIG PATUXENT BRIDGE, BALTIMORE & POTOMAC R. R., MARYLAND.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, Pa.

MANAYUNK BRIDGE, ON PENN'A SCHUYLKILL VALLEY RAILROAD, PENN'A.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, Pa.

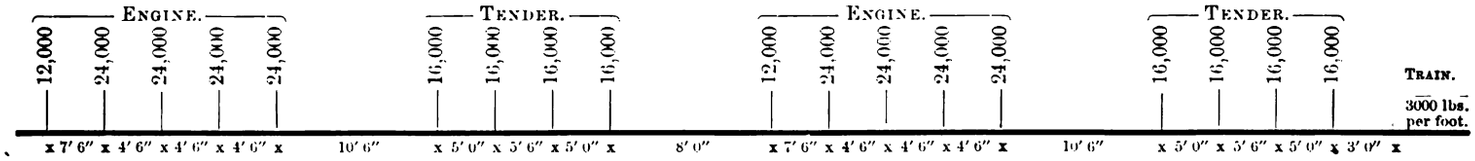
SPECIFICATIONS
FOR
STRENGTH OF IRON RAILWAY BRIDGES.

WILSON BROTHERS & CO.

May 1, 1885.

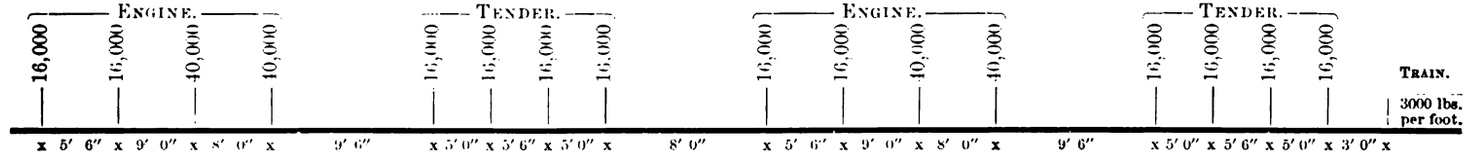
The structure to be wholly of wrought iron, and designed to carry the following live loads on each track, headed in the same direction, on adjacent tracks.

First.—Two typical consolidation engines coupled, weighing, with tender, eighty-six tons each, distributed as follows:



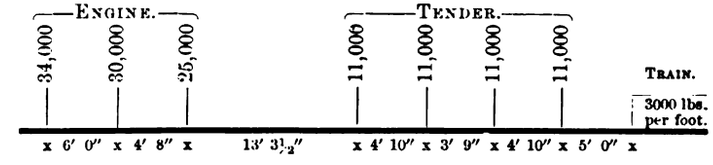
connected with a train weighing 3000 pounds per foot lineal of track; or,

Second.—Two typical passenger engines coupled, weighing, with tender, eighty-eight tons each, distributed as follows:



and connected with a train weighing 3000 pounds per foot lineal of track; or,

Third.—One Class "M" engine, weighing, with tender, sixty-six and one-half tons, distributed as follows:



and connected with a train of 3000 pounds per foot lineal of track. The maximum given by either of these methods of loading is to be used in proportioning every member of the structure.

In calculating web members of trusses and girders, the cross-girder load under the drivers is to be considered as the head of the train, the load on the preceding cross-girder being neglected.

In addition to the live loads before mentioned, the structure shall carry the following dead load, viz.:

At the panel points of the loaded chords:

First.—The weight of the floor (composed of "a," the weight of the cross-ties used for the particular kind of floor adopted, and "b," a weight of one hundred and forty pounds per foot lineal of track, covering the weight of rails, guard rails, splices, spikes, and bolts).

Second.—One-half the weight of the truss.

Third.—The weight of the iron floor system, if any.

Fourth.—The weight of the lateral system belonging to the loaded chord; and

Fifth.—One-half the weight of the sway bracing.

At the panel points of the unloaded chords:

First.—One-half the weight of the truss.

Second.—The weight of the lateral system belonging to the unloaded chord; and

Third.—One-half the weight of the sway bracing.

The span for calculation is to be taken from centre to centre of end pins, or from centre to centre of abutment plates or other supports; and the height from centre to centre of chord pins in truss bridges, or between centres of gravity of flange sections in plate girders, provided it does not exceed the distance out to out of angles, in which case the latter amount shall be considered the height.

The maximum and minimum stresses in compression and tension, as found for the before-mentioned loads, are to be used in determining the permissible working stress in each piece of the structure according to the following formulæ:

For pieces subject to one kind of stress only (all compression or all tension):

$$a = u\left(1 + \frac{\text{minimum stress in member.}}{\text{maximum stress in member.}}\right) \qquad (1)$$

For pieces subject to stresses acting in opposite directions:

$$a = u\left(1 - \frac{\text{maximum stress of lesser kind.}}{2 \text{ maximum stress of greater kind.}}\right) \qquad (2)$$

In the above formulæ:

"a" = permissible stress per square inch, either tension or compression.

"u" = for double-rolled iron in tension (links or rods), 7500 pounds per square inch.

"u" = for rolled iron in tension (plates or shapes), 7000 pounds per square inch.

"u" = for rolled iron in compression, 6500 pounds per square inch.

The permissible stress "a" for members in compression is to be reduced, in proportion to the ratio of the length to the least radius of gyration of the section, by the following formulæ:

For both ends fixed "b" $= \dfrac{a}{1 + \dfrac{l^2}{36{,}000\, r^2}}$ (3)

For one end hinged "b" $= \dfrac{a}{1 + \dfrac{l^2}{24{,}000\, r^2}}$ (4)

For both ends hinged "b" $= \dfrac{a}{1 + \dfrac{l^2}{18{,}000\, r^2}}$ (5)

Where "a" = permissible stress previously found.
"b" = allowable working stress per square inch.
"l" = length of piece in inches centre to centre of connections.
"r" = least radius of gyration of the section in inches.

Pieces used in compression, which are continuous over points of support, are to be considered as "hinged" at the ends, unless so firmly fixed in direction as to be incapable of bending in opposite directions on the opposite sides of the points of support:

In all cases, where possible, the lines of the neutral axes of all pieces meeting at a joint must be made to meet in the same point; and where pins are used to form connections they must be placed as nearly as possible in the neutral axes of the sections. When not so arranged, provision must be made for taking up the bending stresses produced.

When the floor system rests directly on the upper chords of deck bridges, the said chords shall be so proportioned that the algebraic sum of the stresses per square inch on the outer fibres [due,

First.—To the weight of that part of the floor system which is supported by the chord (considered as acting on a continuous beam of a span equal to the panel length).

Second.—To the direct thrust.

Third.—To three-fourths of the maximum bending produced by that portion of an engine of the heaviest class which is supported by the chord, on a span equal to the panel length (considered as a supported beam); and

Fourth. (In case the pin is not in the neutral axis of the chord)—To the algebraic sum of the moments of all chord stress increments acting at centres of pins.]

shall not exceed at the panel point the working stress "a," or shall not exceed at the centre of the panel the working stress "b."

All other members which are subject to direct stress in addition to bending moment are to be similarly calculated.

Built chords must be thoroughly spliced and the splices riveted in the field, not bolted.

The eyes on all tensile members shall have fifty per cent. excess of material at the pin when the diameter of the pin does not exceed the width of the bar, and one hundred per cent. excess when the diameter is twice the width of the bar or over. For intermediate sizes of pins the excess of eye may be made proportional to their diameter.

The diametrical bearing between pins and pin holes (diameter of pin $\times$ thickness of bearing) shall not be less in area than

$$\frac{3}{2}\left(\frac{\text{maximum stress in member.}}{\text{compressive unit stress "}a\text{" for that member.}}\right)$$

Eye plates must have a sufficient size and number of rivets to properly distribute the bearing stress from the pins to members of the truss.

Pins are to be so proportioned that the maximum stress per square inch on the outer fibres (calculated from the cumulative moments of the stresses acting on the pieces connected, and the moment of resistance of the pin directly) shall not exceed one and one-half times the maximum tensile stress "a" in the members connected.

All rods with screw ends must be upset, and if ordinary nuts are used they must be double. Rods having adjustment must have an addition of five tons to the calculated stress for initial tension.

Floor-beam hangers must have an additional section of

twenty-five per cent. above that given by the before-mentioned limiting stresses.

Rivets must be so spaced that they shall not be further apart in the direction of the stress than twelve times the thickness of the thinnest external plate connected, and not more than thirty times that thickness at right angles to the line of stress.

Rivets must be kept a sufficient distance from the sides and ends of pieces to avoid any danger of splitting out, and not placed closer than three diameters centre to centre.

Single lattice straps shall have a thickness of not less than one-fortieth ($\frac{1}{40}$), and double straps connected by a rivet at the intersection not less than one-fiftieth ($\frac{1}{50}$) of the distance between the rivets connecting them to the compressed members; and their width shall be:

For 15 inch and 12 inch channels, or equivalent built section ($\frac{7}{8}$ inch rivets), 2½ inches.

For 15 inch and 12 inch channels, or equivalent built section ($\frac{3}{4}$ inch rivets), 2¼ inches.

For 10 inch and 9 inch channels, or equivalent built section ($\frac{3}{4}$ inch rivets), 2¼ inches.

For 8 inch and 6 inch channels, or equivalent built section ($\frac{3}{4}$ inch rivets), 2 inches.

For 8 inch and 6 inch channels (extra light sections) and 5 inch channels ($\frac{5}{8}$ inch rivets), 1¾ inches.

The distance between connections of the strapping shall be such that the individual members composing the column considered with "hinged" ends and a length equal to the distance between these connections shall be stronger than the column as a whole; and in no case shall this distance exceed eight (8) times the least width of these members.

All segments of members in compression connected by strapping only shall have terminal cross-bracing plates at each end, the rivets and net section of which shall be sufficient to transfer the total maximum stress borne by the segment, and the thickness of which shall not be less than one-fortieth ($\frac{1}{40}$) of the distance between the rivets connecting them to the compressed members.

The shear or net section of any member shall not exceed the compressive working stress "a," and in case of rivets at least twenty per cent. extra section must be allowed.

No allowance shall be made for the web in calculating the flange sections of plate girders.

The stresses in solid rolled beams shall be calculated from the moment of inertia of the section.

Flanges of plate girders running over twelve inches in width shall have at least four lines of rivets.

The stress in the outer fibres of I beams, channels, etc., subject to bending moments, shall not exceed the tensile working stress "a" for rolled shape iron.

In all cases for compressed flanges of beams or girders (subject to transverse stress), the permissible working stress in such flanges shall be computed by Rankine's formula:—

$$c = \frac{a}{1 + \frac{l^2}{5000\ w^2}} \qquad (6)$$

Where "a" = permissible stress previously found.
"c" = allowable working stress per square inch.
"l" = unsupported length in inches.
"w" = width in inches.

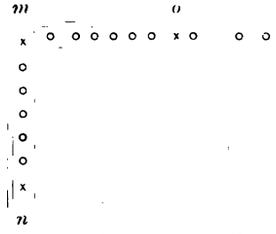
In no case shall a stress greater than that for a length equal to twelve times the width be used.

The rivets in plate girders shall be proportioned for shear as previously specified, and the rivets through the web and flange angles, and through the web and vertical stiffeners, at a splice, concentrated load, or end of girder, must not have a bearing pressure per square inch against the web plate (on a diametrical section of the rivets) of more than twice the compressive stress "a" used in the upper flange of the girder, provided that they are not placed closer than twice their

diameter from the edge of the web plate to edge of hole. If placed closer than this the bearing pressure must be proportionally reduced.

In calculating the shearing stress and bearing stress on web rivets of plate girders, the whole of the shear acting on the side of the panel next the abutment is to be considered as being transferred into the flange angles in a distance equal to the depth of the girder.

The number of rivets in the flanges in the distance "*m*"—"*o*" (equal "*m*"—"*n*") shall be sufficient to transfer the shear at "*m*"—"*n*" into the flange angles without exceeding the specified shearing stress or the bearing stress on diametrical section of rivets, and the number of rivets in the distance "*m*"—"*n*" shall follow the same rule.



Net sections must be used in all cases in calculating tension members, and in deducting rivet holes they must be taken one-eighth inch larger than the size of rivets.

In calculating the net section of angles in plate girders *all* the rows of rivets must be deducted, and in flange plates having rivets staggered all rows must be deducted unless so arranged that the net section along a zigzag line, taking all distances in the diagonal direction at only three-fourths their value, exceeds the corresponding net section directly across the plate.

When the thickness of the web plate is less than one-thirtieth of the unsupported distance between flange angles, heavy stiffeners shall be riveted on both sides of the web, with a close bearing against the upper and lower flanges, and calculated as columns for the whole shearing at the several points where they are placed. These stiffeners, in girders over three feet in depth, shall be placed at distances apart (centre to centre), generally not exceeding the depth of the full web plate, with a maximum limit of five feet. In girders under three feet depth they may be three feet apart, and in some special cases, where there is little or no shearing stress, at a greater distance.

In every case at least one upper flange plate on plate girders shall extend from end to end of the same to give lateral stiffness, and any additional plates used to make up the flange section shall be made of such length as to allow of at least two rows of rivets, of the regular pitch, being placed at each end of the plate beyond the theoretical point required.

Girders formed with web plate and angles alone, having no upper flange plate proper, will not be allowed.

All flange plates subject to either tension or compression, spliced in the length of girder, must be covered by an amount of extra material equal in section to the pieces spliced, with sufficient rivets on either side to transmit the stresses from the parts cut.

Flange angles must be spliced with angle covers whenever cut within the length of the girder, or else the amount of material cut must be replaced by an equal amount of extra material in the flange plate.

No iron shall be used of less thickness than one-quarter inch, no piece used in compression shall have an unsupported width of more than thirty times its thickness, and no plate girder web shall be less than three-eighths of an inch in thickness.

Continuous girders will not be permitted, except in the case of upper chords carrying floor and in drawbridges.

Through bridges must have a clear head room of not less than eighteen feet six inches from base of rail.

Standard inside clear width for full through bridges, single

track on a tangent, is thirteen feet. Width for bridges on curves and half-through bridges, where girders project up above the track, is subject to modification, depending upon the special case.

Truss bridges are to be cambered with a rise of not less than $\frac{1}{1200}$ of their length; the cross-ties to be sized down over the track girders, so that the camber line of track may be a true circular arc.

Cross-ties to be of white oak, having a width of ten inches and a minimum depth of seven inches, and spaced not over twenty inches between centres, with every fourth tie bolted down by three quarter inch bolts having round flat heads, and two hexagon nuts each. When track is curved, the outer rail to be elevated as may be required.

In the case of deck bridges with wooden floor beams, when the distance between centres of supports exceeds six feet, the floor beams (ties) are to be proportionally increased.

Guard rails of white oak or long-leaved southern pine, six by eight inches, are to be placed ten inches in the clear outside of each track rail; to be notched one and one-half inches over the cross ties, secured to every fourth tie by a three-quarter inch bolt, having flat round head, two hexagon nuts, and flat wrought washer, and to all other ties by three-quarter inch square wrought spikes. Splices to guard rails to be twelve inches long, placed between ties, with the joint horizontal, two three-quarter inch bolts with flat round heads, wrought washers and double hexagon nuts being used for each.

Lateral bracing shall be proportioned for a wind pressure, acting in either direction horizontally, of thirty pounds per square foot on the whole surface of all trusses and the floor, as seen in elevation, in addition to a train of ten feet average height, beginning two feet six inches above base of rail, moving across the bridge; except in the case of through bridges, where the surface of the truss covered by the train may be deducted.

Where the bridge is on a curve, the lateral bracing, in addition to wind stress, must be proportioned to resist a centrifugal force due to as many trains as there are tracks, moving at the rate of sixty feet per second.

The whole of the wind stress due to the train and floor, plus one-half the truss, is to be considered as acting on the lateral bracing of the loaded chord, and that due to one-half the truss only on the lateral bracing of the unloaded chord. The end portal bracing in through bridges must be of sufficient strength to transfer the accumulated wind stress from the upper lateral system to the end posts, and the end sway bracing in deck bridges shall carry the whole of the accumulated wind and centrifugal stress from the loaded chord to the abutment, intermediate sway bracing being placed in each main panel, and adapted to carry half the maximum stress increment due to the wind on the train and to centrifugal force. In case of very heavy curves, some of the centrifugal force may be transferred to the lower lateral bracing.

In through plate girders the portion of the train covered by the girder may be deducted from the wind surface, and only one girder and one train surface considered.

In all cases where the rods have adjustment, an addition to the above stresses of five tons must be made for initial tension.

Lateral rods in tension shall not be strained more than 15,000 pounds per square inch, and plate or shape iron not more than 12,000 pounds per square inch under the above conditions.

Lateral struts in compression shall not be strained more than 12,000 pounds per square inch (including the proper component of the initial tension allowed on the lateral rods at their extremities), and reduced in proportion to their length and least radius of gyration, as previously specified.

In case the maximum stresses in the chords of the bridge or flanges of floor girders due to wind and centrifugal force (the chords and lateral bracing being considered as a truss

lying on its side), added to the maximum stresses in the chords or flanges due to vertical loading, shall exceed the before-mentioned limits of 15,000 and 12,000 pounds per square inch in tension, and 12,000 pounds per square inch in compression, properly reduced, additions must be made to said chords or flanges until such limits are not exceeded.

Should the stresses in said chords be reversed in any possible case, proper provision must be made for such stress in an opposite direction.

No deduction shall be made from chord sections on account of material in lateral system, but the chords shall be made of the full section previously specified.

In every case the connections between the wind bracing and chords must be made of greater strength than the wind bracing itself, and so designed as to avoid as far as possible inducing bending moments in any members of the structure; and such connections must be capable of transferring the longitudinal components of the wind stresses into the main truss chords in a direct and satisfactory manner, or a separate chord be used for the lateral system.

The trusses must be secured from side motion on bearing plates, and must have ample bearing and roller support, the weight on the rollers not to exceed $750\sqrt{d}$ pounds per lineal inch, d being the diameter in inches. Girder bridges less than sixty-five feet opening will not require rollers. The bolster blocks must be joined to the truss. The bearing plates must be secured to the underlying support by bolts or dowels. Bearing plates shall not give a greater pressure on masonry than 300 pounds to the square inch, unless in specially authorized cases.

In the case of trestles or iron piers, they shall be proportioned for vertical load under the same limiting stresses given for trusses, and for wind stresses and centrifugal stresses, loading and bending combined, the stresses shall not exceed those given for lateral bracing.

In addition to the above, the structure shall be capable of resisting wind pressure on its exposed surface alone of fifty pounds per square foot without exceeding the limiting stresses for lateral bracing.

Tension at the foot of the windward column is to be avoided if possible, and in any case approved anchor bolts well secured in the masonry shall be used.

All strain sheets and plans must be submitted to the engineer of the company in charge of bridges for approval, and a complete set, including details, furnished to him without charge. All details to be subject to his approval, and access to be allowed him or his assistants to the contractor's working drawings and shops for examination of details.

Quality of Material.—All wrought iron must be tough, fibrous, uniform in quality throughout, free from flaws, blisters, and injurious cracks, and must have a workmanlike finish. It must be capable of sustaining an ultimate stress of 46,000 pounds per square inch on a full section of test piece, with an elastic limit of 23,000 pounds per square inch.

All iron to be used in tension or subjected to transverse stress (except web plates) must have a minimum stretch on a length of eight inches of fifteen per cent., measured after breaking.

All iron to be used in compression and for web plates, of width not exceeding twenty-four inches, must have a minimum stretch of ten per cent. on a length of eight inches, measured after breaking.

All iron for web plates exceeding twenty-four inches in width must have a minimum stretch of five per cent., measured in length of eight inches.

All iron to be used in the tensile members of open trusses, laterals, pins, bolts, etc., must be double rolled after and directly from the muck bar (no scrap will be allowed), and must be capable of sustaining an ultimate stress of 50,000 pounds per square inch on a full section of test piece, with an

elastic limit of 25,000 pounds per square inch, and a minimum stretch of twenty per cent. in length of eight inches, measured after breaking.

When tested to the breaking, if so required by the engineer, the links and rods must part through the body and not through the head or pin hole. Such tests must be at the expense of the contractor when the requirements of these specifications are not complied with.

All tension wrought iron, if cut into testing strips one and one-half inches in width, must be capable of resisting, without signs of fracture, bending cold by blows of a hammer until the end of the strips form a right angle with each other, the inner diameter of the curve of bending being not more than twice the thickness of the piece tested. The hammering must be only on the extremities of the specimens, and never where the flexion is taking place. The bending must stop when the first crack appears.

All the tension tests are to be made on a standard test piece of one and one-half inches in width, and from one-fourth to three-fourths inches in thickness, planed down on both edges equally, so as to reduce the width to one inch for length of eight inches. Whenever practicable, the two flat sides of the piece to be left as they come from the rolls. In all other cases *both* sides of the test pieces are to be planed off.

All plates, angles, etc., which are to be bent in the manufacture, must, in addition to the above requirements, be capable of bending sharply to a right angle at a working heat without showing any signs of fracture.

All rivet iron must be tough and soft, and pieces of the full diameter of the rivet must be capable of bending until the sides are in close contact without showing fracture on the convex side of the curve.

Pins of four and a half inches diameter or less may be rolled iron, but those of greater diameter must be forged.

Workmanship.—All workmanship must be first-class; all abutting surfaces, except flanges of plate girders, must be planed or turned so as to insure even bearings, taking light cuts so as not to injure the end fibres of the piece, and must be protected by white lead and tallow. Abutting members must be brought into close and forcible contact when fitted with spice plates, and the rivet holes reamed in position before leaving the works, the plates being marked so as to go in the same position in erecting.

Generally the use of bolts instead of rivets will not be permitted, unless they are turned conical and the holes reamed to fit them.

Rollers must be turned and roller beds planed.

Rivet holes must be carefully spaced and punched, and must in all cases be reamed to fit, where they do not come truly and accurately opposite, without the aid of drift pins. Rivets must completely fill the holes and have full heads, and be countersunk when so required, and machine driven wherever possible.

Compression members must be straight and free from kinks or buckles in the finished piece.

All pin holes in pieces which are not adjustable for length must be accurately bored at right angles to the axis unless otherwise shown in the drawings, and no variation of more than one-sixty-fourth of an inch will be allowed in the length between centres of pin holes. Eye bars must be perfectly straight before boring; the holes must be in the centre of the head, and on the centre lines of the bar. Whenever links are to be packed more than one-eighth of an inch to the foot of their length out of parallel with the axis of the structure, they must be bent with a gentle curve until the head stands at right angles to the pin in their intended position before being bored; suitable blocking pieces being used to keep them in proper position during the operation of boring. All pieces must be at equal temperatures when bored, and

those belonging to the same panel, when placed in a pile, must allow the pin at each end to pass through at the same time without forcing. Pins must be carefully turned, perfectly finished, and straight, and when driven in must have pilot nut to preserve threads. No variation of more than one-thirty-second of an inch will be allowed between diameter of pin and pin hole. In the case of bolts, a variation of one-sixteenth of an inch will be allowed between diameter of bolt and hole. Thickening washers must be used whenever required to make the joints snug and tight.

All iron must receive one coat of raw linseed oil as soon as received at the works, and a coat of approved red oxide of iron before leaving the works. All inaccessible surfaces are to be painted with one heavy coat of red oxide of iron in pure linseed oil. All iron to be scraped clean from the scale before painting.

The whole of the construction to be first-class work, and in strict accordance with the drawings and these specifications. In the case of sub-contractors, the specifications are fully binding on them in every respect, and free access and information is to be given by them for thorough inspection of material and workmanship, and all required test pieces, etc., properly shaped, are to be provided as may be requested without charge. All shipments of material not properly inspected and passed are at the risk of the contractor.

In all cases figures are to be taken in preference to any measurements by scale. No alterations are to be made unless authorized by the engineers.

DESIGN FOR STREET BRIDGE OVER HARLEM RIVER, NEW YORK.

Architectural Department.

Man needs a covering, a protection from the weather, a place of abode. A mere tent, a cave in the rocks, or a log hut at first answers all purposes; but man is a progressive animal, and as civilization increases, the demands of refinement require more. The hut is improved; it is made more permanent in its construction; it grows into a house. The house has conveniences added to it; separate rooms for separate uses; requirements of comfort and luxury have to be satisfied; it must be beautified in appearance to satisfy the growing taste of the owner; it becomes a palace. The gradations of the house in all its stages are well defined and easily traced, but the original idea of a shelter still remains throughout all, no matter how magnificent the building or what its special use.

Religious development, higher civilization, refined tastes, and the introduction of steam power, etc., demanded other edifices than dwellings, such as temples, tombs, assembly halls, theatres, manufactories, railroad stations, etc., all of which, however, still preserve the primary feature of a shelter, each with its peculiar adaptations.

So long as simplicity existed and mere necessity was to be satisfied, the builder or master-workman was quite competent to design and carry out the erection of the structures (as is still the case under similar circumstances); but the wants of a higher life became so complicated that none but a man whose cultivation enabled him to appreciate these requirements was capable of duly providing for them, and the architect was developed.

It has been well said that the architect requires the "experience of the builder, the training and observation of the scholar, and the feeling and inspiration of the artist." An architect should be thoroughly educated in all of his art that has gone before him; and while he uses the experience of others for the benefit of himself and clients, yet he should not allow precedent to fetter his reason or prevent him from

properly adapting his work to local conditions and special wants.

Architecture in America has passed through its preliminary stages, and immense strides have been made during the past ten years. The æsthetic taste of the people has been cultivated, and very much more is now demanded (beyond what was quite satisfactory in the old times) in this respect, as well as in the more practical points of increased comforts and conveniences, to say nothing about such entirely modern sciences as sanitation, electricity, etc.

The necessity of conforming to the requirements of climate, local customs, and other matters has developed modifications in style (from European practice) that are strictly American. These variations are apparent even in different places on our own continent, each great city having its own special characteristics more or less marked, which are easily distinguished throughout the surrounding country.

One great drawback to the full development of the art of architecture in this country is the great haste with which work is required to be done. No sooner are the preliminary studies of a building prepared than bids must be received, a contract closed, and the work proceeded with. No time is allowed to study and perfect a design, to work up and improve the details, and to give it true artistic finish.

The architect is exhorted by Ruskin to bear in mind the possible virtues of architecture:

1. "That it act well, and do the things it was intended to do in the best way."

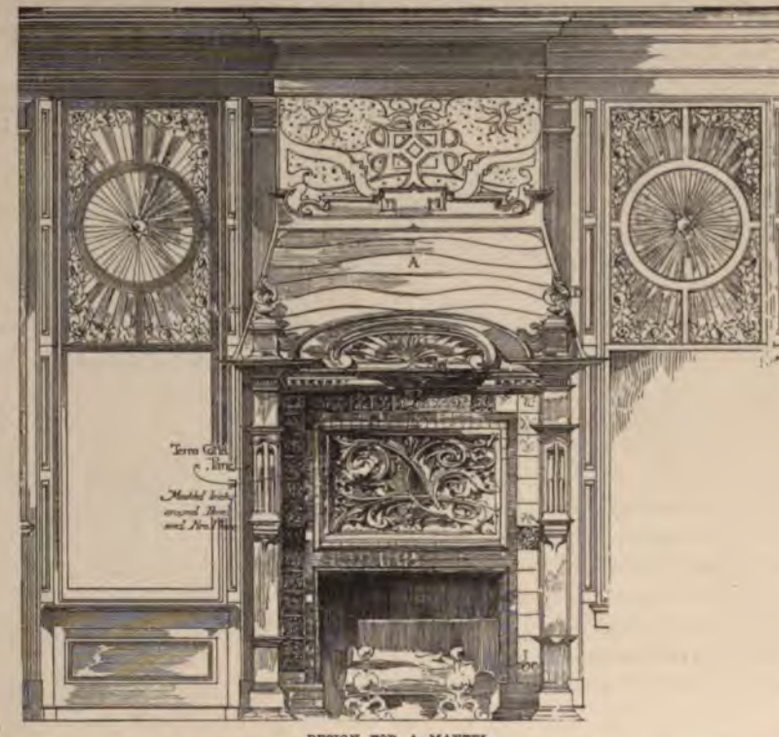
2. "That it speak well, and say the things it was intended to say in the best words."

3. "That it look well and please us by its presence, whatever it has to do or say."

But how can this be done if his client will not allow the proper time for the study of the subject?

A building should be of good construction and good decoration. It must not only answer its purpose, but answer it in the simplest way and with no over-expenditure of money.

Ferguson, one of the most noted writers on architecture of the present day, expresses very well the differences between the builder, the architect, and the engineer. The builder merely heaps materials together in the readiest way to attain his desired end. The engineer selects the best and most appropriate materials for the object he has in view, and uses them in the most scientific manner for economy and satisfactory results. The architect arranges the materials of the engineer not so much with regard to economy as to artistic effect, and by light, and shade, and outline strives to produce a form that is in itself permanently beautiful. He then on this places his ornamentation, enriching by its elegance the whole composition.



DESIGN FOR A MANTEL.

Ferguson goes on to say that "it is evident that there are no objects that are usually delegated to the engineer which may not be brought within the province of the architect. A bridge, an aqueduct, the embankment of a lake, or the pier of

a harbor, are all as legitimate subjects for architectural ornament as a temple or palace.

"While it is not essential that the engineer should know anything of architecture, yet it is certainly desirable that he should

DESIGN FOR DOOR-PLATE IN POLISHED BRASS, BROAD STREET STATION, PHILADELPHIA.

do so; but, on the other hand, it is indispensably necessary that the architect should understand construction, or at least should be able to avail himself of the knowledge of the engineer.

"A building may be said to be an object of architectural art in the proportion in which the artistic or ornamental purposes are allowed to prevail over the mechanical; and an object of engineering skill where the utilitarian exigencies of the design are allowed to supersede the artistic. But it is nowhere possible to draw the line sharply between the two, nor is it desirable to do so. Architecture can never descend too low,

nor need it ever be afraid of ornamenting too mean objects; while, on the other hand, good engineering is absolutely indispensable to a satisfactory architectural effect of any class. The one is prose, the other is poetry of the art of building."

By combining both professions, and being able to cover at once and with certainty any questions which may arise in either, the one is made to supplement the other and both work in harmony together, thus producing the best results, and avoiding the difficulties constantly arising where the two professions are practised separately. We are frequently called upon by architects standing high in their profession, and otherwise entirely competent to carry it on successfully, to furnish them with plans and calculations for roofs, girders, etc., and to figure out for them matters involving construction, which, if not properly cared for, would cause the best designs and the finest decorations to prove utter failures.

This must be our answer to a criticism which we well know is sometimes made regarding the operations of our firm, viz.: that we unite too many branches of business in one establishment. So intimately is the constructive skill of the engineer united with the decorative and artistic taste of the architect, that we are at a loss to understand how the two professions can be successfully practised separately.

We present in this volume photographic views of some of the buildings which we have constructed, and to which, in connection with the record of work executed, we invite attention as showing the various classes of architectural work on which we have been engaged.

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INTERIOR DECORATION, PRIVATE RESIDENCE, STATEN ISLAND, N. Y.

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FAMILY VAULT, GREENWOOD CEMETERY, BROOKLYN, N. Y.

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COTTAGE—STOCKTON BATH HOUSES, CAPE MAY, N. J.

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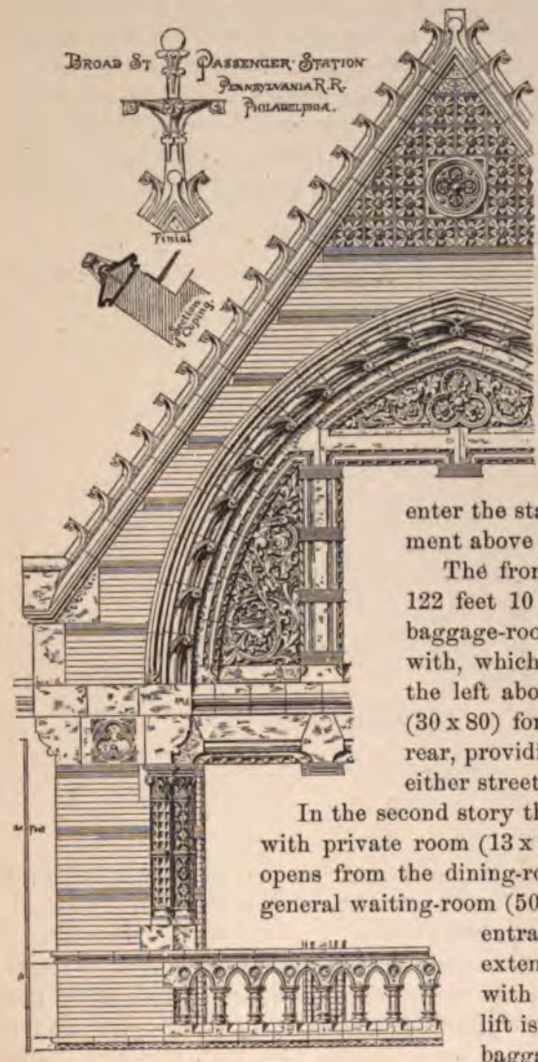


GABLE, BROAD STREET.

Broad Street Passenger Station, Pennsylvania R. R., Philadelphia.

The Broad Street Passenger Station, the Philadelphia terminus of the numerous lines of the Pennsylvania Railroad, was opened to the public in January, 1882, and is now well known throughout the country.

The arrangement is peculiar, owing to the fact that the railroad tracks, after crossing the Schuylkill River, are carried on a brick arcade along the south side of Filbert Street, at a considerable elevation above the street, and enter the station at the level of the second floor. The first story thus becomes a kind of basement above ground, and is so treated architecturally.

The front on Broad Street measures 193 feet 5 inches, and the depth on Filbert Street is 122 feet 10 inches. On the right about 80 feet of the frontage is occupied by ticket offices, baggage-room (departing), 30 x 73, and a lobby, 40 x 80, for passengers in connection therewith, which lobby contains stairs and elevators to the waiting-rooms on second floor. On the left about 34 feet is occupied by the exit staircase, behind which is the baggage-room (30 x 80) for arriving baggage. The central portion, about 80 feet, is left open from front to rear, providing a convenient passageway for carriages, to which passengers have access from either street under cover.

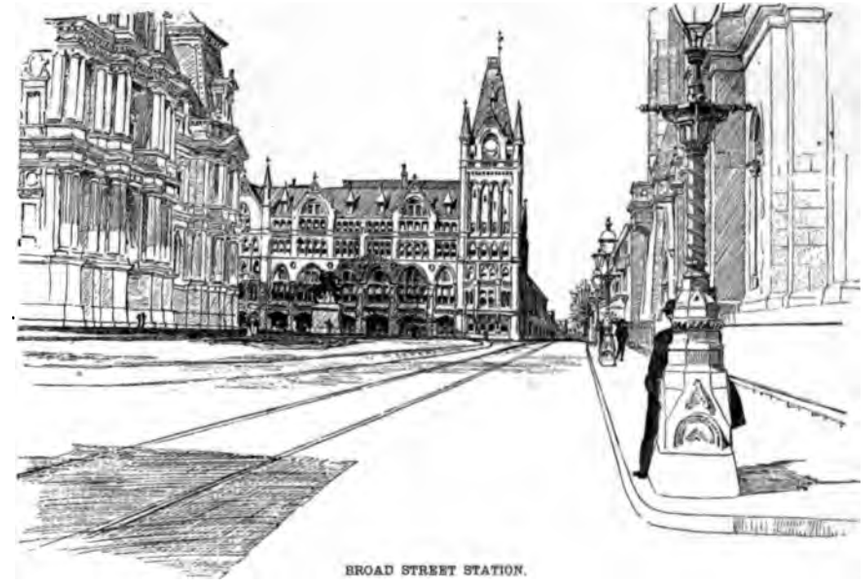
In the second story the entire frontage on Broad Street is occupied by the ladies' waiting-room (29 x 80), with private room (13 x 28) and toilet attached, and the dining-room (29 x 74). The restaurant (40 x 50) opens from the dining-room, and is served by private stair and dumb-waiters from kitchen above. The general waiting-room (50 x 80) adjoins the ladies' waiting-room and the restaurant. It is approached by the entrance stair and elevators from first floor, and opens on the train lobby (30 x 190), extending the whole length of the building on rear (Fifteenth Street), and communicating with trains by gates. The exit stair descends directly from this lobby, and a baggage-lift is provided at each end, connecting with the baggage-rooms for arriving and departing baggage. The offices in the upper stories are approached from this lobby by a private

stair and passage on the Filbert Street front, which also affords access to the toilet-rooms for gentlemen.

The train-house, which begins at the gates from the lobby, extends about 450 feet in length to Sixteenth Street, being carried across Fifteenth Street on girders. It contains eight passenger tracks and platforms.

Looking up Filbert Street from the Masonic Temple the view of the building is very pleasing, the color showing up richly against the white marble of the new City Hall, which sets well back, making a sort of plazza. (See sketch.)

The style of the building is a modern adaptation of Gothic architecture. The eastern or principal front is divided into six unequal bays by piers and buttresses, flanked on the north by a clock-tower, and on the south by a gable, in which are

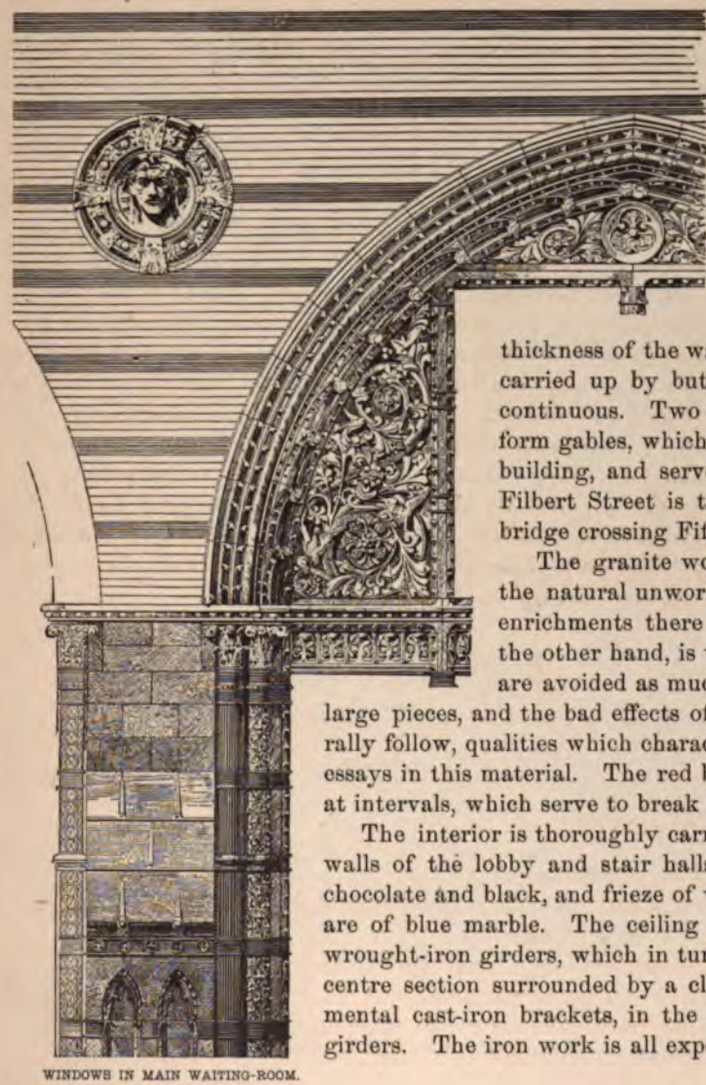


BROAD STREET STATION.

the openings to the exit hall and stairs. The tower and two bays next to it include the ticket offices, lobby, entrance stairs, etc., the other bays being open through on the street level, so that carriages may drive under.

The basement or first story is of granite, above which are three stories of red brick and terra-cotta. The second floor, as before mentioned, is at the level of the tracks, where all the principal apartments are located. The second story is therefore the principal one, and is so treated architecturally, the height of the large rooms being divided at either end by entresols.

The piers are carried up, from their granite bases, in terra-cotta as far as the springing of the large windows of the second story, the jambs of which are decorated with slender terra-cotta columns, two to each side, with enriched shafts



WINDOWS IN MAIN WAITING-ROOM.

7

and caps, from which rise the great arches of elaborate terra-cotta work in three orders.

The transom lights are kept rectangular, forming spandrels under the arches, which are of terra-cotta, richly decorated. Over the piers between these arches are circular panels, containing finely modelled heads typical of the races of humanity, indicating the cosmopolitan character of the institution and its widespread benefits. The upper stories, being occupied by offices of the company, are more plainly treated, and the openings are made smaller and more numerous to suit the necessary subdivisions. At the level of the fourth floor a balcony is got in the thickness of the wall, the face above being set back and the line of the wall face below carried up by buttresses, through which openings are pierced, making the balcony continuous. Two of the bays of this front are carried up through the cornice, and form gables, which contain windows lighting an attic story extending over the whole building, and serve to break the otherwise long lines of the cornice. The front on Filbert Street is treated in a similar manner, extending from the clock-tower to the bridge crossing Fifteenth Street, and connecting with train-house.

The granite work is executed with extreme simplicity, the blocks being large, and the natural unworked surfaces being used wherever practicable. The mouldings and enrichments there used are bold and simple in character. The terra-cotta work, on the other hand, is very elaborate. The individual pieces are small, and plain surfaces are avoided as much as possible, to obviate the difficulties met with in manufacturing large pieces, and the bad effects of warping and shrinking. Delicacy and elaboration of detail naturally follow, qualities which characterize the ancient Italian work, and also the best modern English essays in this material. The red brick work is relieved by bands of moulded brick of the same color at intervals, which serve to break agreeably the plain surfaces without destroying the solid effect.

The interior is thoroughly carried out in the same style as the exterior. In the lower story the walls of the lobby and stair halls are faced with enamelled brick in buff and white, with dado of chocolate and black, and frieze of white and blue in patterns. Caps and corbels, arches, skirtings, etc., are of blue marble. The ceiling is arched in brick between rolled iron beams, supported on heavy wrought-iron girders, which in turn are upheld by powerful cast-iron columns, consisting of a square centre section surrounded by a cluster of four shafts with caps and bases, from which spring ornamental cast-iron brackets, in the shape of a quarter circle, connecting with the undersides of the girders. The iron work is all exposed to view, and decorated in colors. The floor of the driveway is

laid with a pavement of asphalt, and the rest of this floor is artificial stone. The wood finish of this story is ash. The stairs to the waiting-rooms above are marble, with a handsome wrought-iron railing.

In the second or principal story the jambs and arches of the openings are marble, and the floors marble tile, except in the lobbies, etc., where artificial stone is used in colored patterns with good effect. In the lobbies and other exposed portions the walls are colored and enamelled bricks; elsewhere panelled wooden dadoes are used.

The ceilings of the ladies' waiting-room, dining-room, exit stair hall, and lobby to train-house are hard wood, divided into panels by the girders supporting the floors above, and subordinate moulded ribs running between them.

In the ladies' waiting-room, dining-room, and exit stair hall the ceiling is supported by curved trusses springing from the walls at the same level as the springing of large windows, and resting on marble corbels built in the walls. These arched trusses are quite elaborate in design, and add much to the beauty of the apartments.

The waiting-rooms, dining-room, and ladies' private room have large open fireplaces, and the transoms of windows and doors and the ceiling over main waiting-room are glazed with cathedral glass in lead, plate-glass being used elsewhere.

The train-house is divided into two equal spans of 80 feet by a row of wrought-iron columns enclosed in ornamental open casings of cast-iron, which carry the roof trusses. These trusses are wrought-iron, in the form of a double segment, meeting at the ridge in a low Gothic arch, with ornamental struts and tie-rods. The walls are red pressed brick, divided into panels by moulded pilasters and arches, the pilaster caps being red terra-cotta, and the spandrels filled with buff moulded bricks, arranged in patterns. Along the base is a skirting of blue marble, and a moulded sill course of the same stone extends the whole length below the windows, which have semicircular heads following the lines of arches between the pilasters.

Every provision has been made for the comfort and convenience of passengers, and every detail, down to the seats and the push-plates on doors (one of which is shown on page 45), has been carefully considered.

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Passenger Station, Baltimore and Potomac R. R., Washington, D. C.

This building is situated at the corner of Sixth and B Streets, having a depth of 96 feet on the former, and a front of 137 feet on the latter, exclusive of the roof which covers the passenger tracks. The main entrance is on B Street, and the ladies' entrance on Sixth Street.

There is ample accommodation on this ground-floor for passengers, there being a general waiting-room 40 x 68 feet, a ladies' room 23 x 45 feet, a gentlemen's room 20 x 37 feet, and a restaurant 45 x 55 feet, with kitchen, cellars, and all other necessary appliances. There are also on the same floor baggage-rooms, offices, lavatories, etc.

The upper floors are laid out as offices for the Railroad Company, and some dwelling-rooms for janitor, etc.

The foundations of the building are stone supported on piles; the walls above ground are brick, faced with pressed brick, and relieved by dressings of Ohio stone, the base of the structure up to the sill level of the ground-floor windows being faced with Richmond granite. The steps at entrance on each side are Richmond granite, and the shafts of the columns are polished Aberdeen granite. A considerable amount of tile decoration has been introduced in the facework of walls with good effect. The interior of the building is finished in hard woods; the floors of the principal waiting-room, restaurant, etc., are laid with tiles. The building is heated by steam.

An iron roof 510 feet long by 130 feet wide, in one span, is attached to the building, and covers the passenger car tracks.

This building has become historical from the fact of its being the place where President Garfield was assassinated. The exact spot where he fell is marked on the floor of the ladies' room by a brass star, and the event is recorded by a marble tablet on the wall.

PASSENGER STATION—BALTIMORE & POTOMAC R. R., WASHINGTON, D. C.

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PASSENGER STATION ON NEW YORK ELEVATED RAIL ROAD, NEW YORK CITY.

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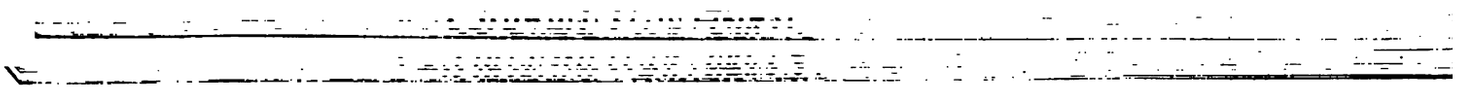
Civil Engineers and Architects,
PHILADELPHIA, PA.



PASSENGER STATION, PENNSYLVANIA RAILROAD, BRYN MAWR, PENN.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

PASSENGER STATION, PENNSYLVANIA RAILROAD, ARDMORE, PENN.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

PHOTO-COLLOTYPE WELLS & HOPE CO. PHILADELPHIA

PASSENGER STATION AT McVEYTOWN, PENNSYLVANIA RAIL ROAD.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

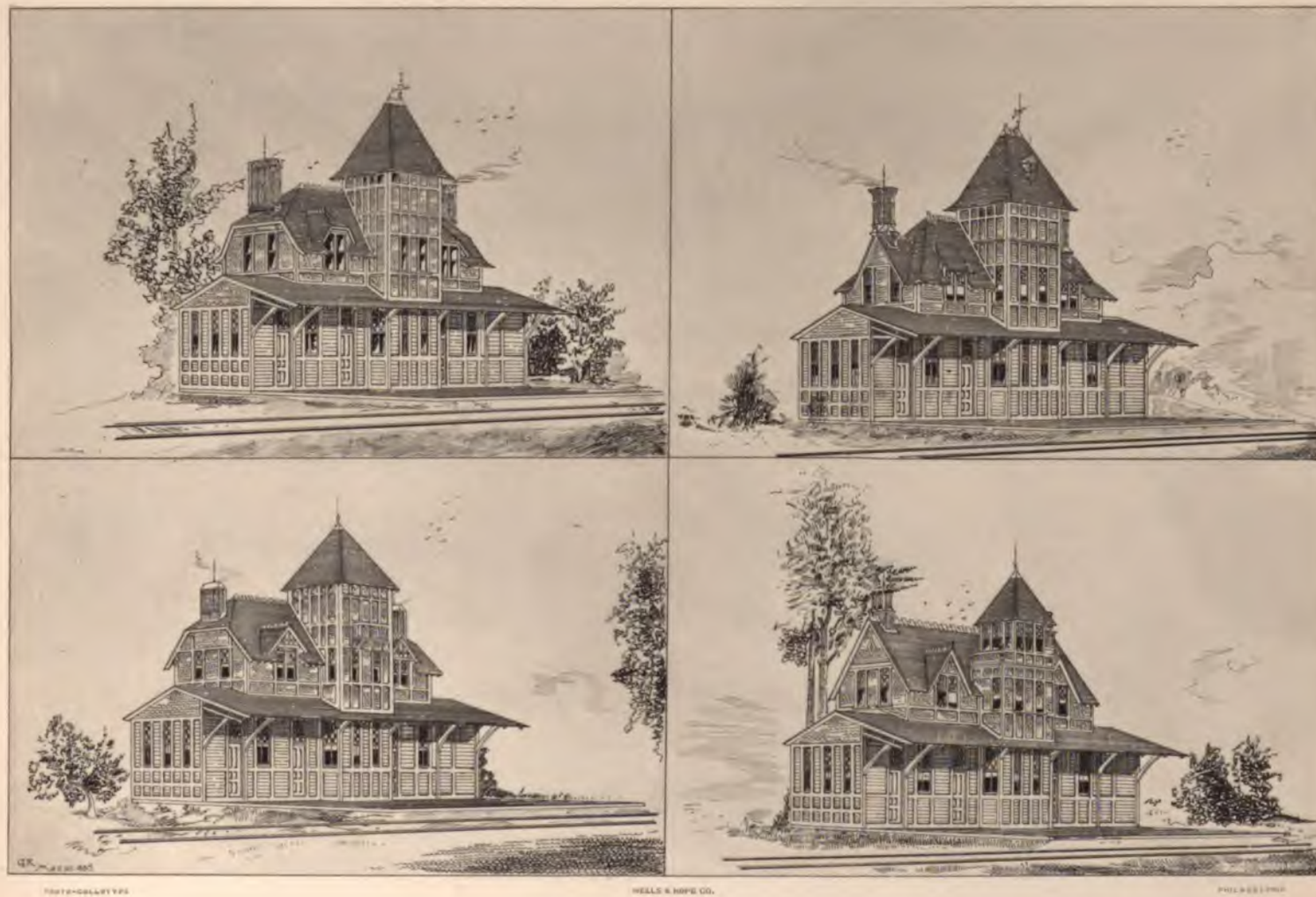
PHOTO-COLLOTYPE WELLS & HOPE CO. PHILADELPHIA

PASSENGER STATION AND AGENT'S HOUSE COMBINED, AT HAWKINS, PENNSYLVANIA RAIL ROAD.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

PASSENGER STATIONS ON NEW YORK, WEST SHORE & BUFFALO RAILROAD.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.



PASSENGER STATIONS ON NEW YORK, WEST SHORE & BUFFALO RAILROAD.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

The State Hospital for the Insane, at Norristown, Pa.

This hospital was designed and constructed with the special object of providing suitable accommodation for the indigent insane at a reasonable cost. The plan adopted was that of two-story brick buildings, separated to afford ample air, light, and safeguards from fire, and to allow of properly classifying the inmates. The original construction, which covered seven ward buildings, boiler-house and laundry, kitchen building, chapel, and administration building, was commenced March 21, 1878, and completed February 17, 1880. Since that time there have been added one ward building, porter's lodge, stables, and sundry farm and out-buildings.

The hospital buildings are situated on an elevated plateau, with their main front facing southeast, and are surrounded by extensive grounds. Portions of the land are under cultivation as farms or truck gardens, affording employment to certain classes of the inmates. The State owns about 300 acres of land in connection with the hospital.

The group of buildings has a front of 1481 feet, and a depth of 913 feet. The general dimensions of the separate ward buildings are,—length, 277 feet; depth, 90 feet.

Each ward building consists of a basement (which is used for steam heating ducts, passageways, and workshops) and two main stories, each of which contains two wards, giving four wards in each building. Each ward is complete in itself, having separate rooms, dormitory, dining-room, bath-room, etc., etc. All buildings are well supplied with water (including a fire service), are lighted by gas, and heated by steam furnished from the central boiler-house. The wards are ventilated by stacks, in which a draft is created by steam coils at their bases, thus drawing the foul air from the wards. All food is prepared in the general kitchen.

The total expenditure for construction of buildings has been $599,850. The hospital has been in use since the summer of 1880, and now contains about 1350 patients, which, however, is a greater number than should be, and the buildings are now overcrowded. The hospital will accommodate comfortably about 1100 patients, and for this number the cost of construction would average about $545 per bed. The administration and supply buildings are adequate for a much larger population, and the capacity of the institution can be increased at a price per bed much less than that stated above.

This institution is a new departure in the construction of hospitals for the insane, and demonstrates the fact that suitable accommodations can be provided for the indigent insane at a low cost, while retaining all necessary and important features, providing proper sanitary conditions, and avoiding extensive and unduly expensive administration buildings. The successful operation of this institution shows that a hospital for the insane need not necessarily be an immense and imposing structure all under one roof.

The Abattoir and Stock-Yards of the Philadelphia Stock-Yard Company.

The Abattoir and Stock-Yards of the Philadelphia Stock-Yard Company are situated on the west side of the Schuylkill River, north of Market Street, and occupy an area of 21 acres.

Cattle are discharged from cars at the western side of the abattoir, being brought in on a branch from the main line of the Pennsylvania Railroad. Another branch is devoted entirely to the delivery of sheep and hogs, serving the portion of the yard set apart for those animals. The whole enclosure is laid out in blocks and streets, the streets being carefully paved and drained, and well lighted at night with electric lights. The accommodations are as follows:

1. Cattle-pens to hold 7300 head.
2. Sheep-pens accommodating 10,000.
3. Hog-pens of about the same capacity.
4. Covered sheds for about 500 cows and calves.
5. The main office and exchange building.
6. Stables for storing and selling horses.
7. The abattoir.
8. Fat and refuse reducing department.

The cattle-pens, 172 in number, are frame structures, only partly covered in, so as to give ample ventilation, and at the same time afford proper protection from the weather. The floors are paved with granite blocks, and are well drained. All the pens are provided with food-racks and water-troughs. The sheep enclosures are two in number, each 350 x 130 feet, and placed at the northern end of the establishment. They are roofed over and paved; each enclosure being divided into suitable compartments for wholesale or retail storage, and fodder-racks and water-troughs are provided where required.

The hog-pens are situated to the east of the sheep-pens. Provision is made everywhere to ensure the utmost cleanliness, but nowhere more particularly than here. The roof of the building is supported on light iron columns, and the pens are divided off with iron railings. The floors are laid with granite blocks grouted in cement, and they are formed with sides sloping to a central gutter, which descends in the other direction to a transverse drain. A stream of water flows constantly along the gutter and carries off all impurities.

The abattoir building is a substantial, permanent structure, having masonry foundations resting on timbers placed below low-water level. The main walls of the building above ground are brick. The main floor is supported throughout the interior of the building on cast-iron columns, a basement being formed below of 11 feet depth. Both the main floor and basement floor are covered with an asphalt pavement, which has sufficient slope to ensure perfect drainage. Two rows of wrought-iron columns carry the roof and divide the building into a central aisle of 50 feet width, and two side aisles of 30 feet each. The central aisle is covered with an arched roof springing 40 feet above the main floor. The side aisles have a height of 20 feet from floor to springing line of roof. Ample light and ventilation are had by large windows and louver ventilators in the roof.

The work of slaughtering the cattle is carried on entirely

on the main floor, the portion devoted to this purpose being divided off into pens, the floors of which are laid with heavy pine planking carefully caulked. The cattle are admitted by doors in the end of the building, through which they pass into the middle aisle, and thence by gates into the slaughtering-pens, the centre space being fenced off from the sides by iron-pipe railings. Each pen is provided with the requisite apparatus for slaughtering, and with appliances for hanging up the carcasses and dressed meat. The blood and refuse are removed to that part of the building devoted to their utilization, and an ample supply of hot and cold water is provided. The building is warmed by steam. The abattoir has a capacity for killing and dressing 1200 head of cattle daily. The sheep are slaughtered in the basement at the west end of the building, where there is a row of raised pens paved with stone and enclosed by a wire fence with iron posts. In front of these pens is a stone table with a gutter running around it for catching the blood of the slaughtered animals. 3000 sheep can be slaughtered and dressed here daily. At the east end of the basement is the engine and boiler department, the grade of the ground on the exterior coming to the basement floor at that point. The engine is 60 horse-power, and the boilers 100 horse-power. In this part of the building is placed the plant for reducing the tallow, and for treating the blood and refuse from the animals. The latter possesses many interesting and novel features, and so complete are all the arrangements, that the business of the abattoir is carried on, practically in the heart of a large city, without being in any way offensive. Every part of the animals slaughtered is utilized, and none of the refuse is allowed to pass into the river.

ABATTOIR OF PHILADELPHIA STOCK-YARD CO., ON SCHUYLKILL RIVER, WEST PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects.
PHILADELPHIA, PA.

OFFICE BUILDING, BALDWIN LOCOMOTIVE WORKS, BROAD AND SPRING GARDEN STREETS, PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

PHOTO-COLLOTYPE WELLS & HOPE CO. PHILADELPHIA

SPRING GARDEN PUMPING STATION, PHILADELPHIA WATER DEPARTMENT, PHILADELPHIA, PA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

TIMES BUILDING, 8th AND CHESTNUT STREETS, PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

INTERIOR. BUSINESS OFFICE OF "THE TIMES," CORNER 8th AND CHESTNUT STREETS, PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, Pa.

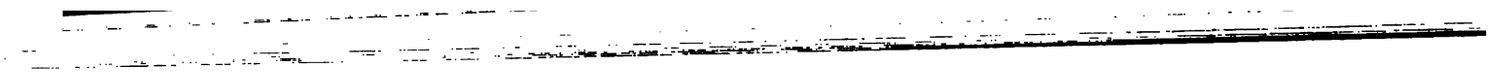


PHOTO-GELLOTYPE WELLS & HOPE CO. PHILADELPHIA

DIVINITY SCHOOL OF THE PROTESTANT EPISCOPAL CHURCH, WOODLANDS AVENUE AND 52nd STREET, PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

INDUSTRIAL HOME FOR BLIND WOMEN, POWELTON AND SAUNDERS AVENUES, PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

The Presbyterian Hospital, Philadelphia.

The Presbyterian Hospital in Philadelphia is situated in a pleasant and healthy location, at the corner of Thirty-ninth Street and Powelton Avenue, the area of ground occupied being nearly three acres.

When the hospital was first established there were several old buildings on the site which were temporarily adapted for service. The want of proper accommodation increasing, a male surgical pavilion ward was built in 1873, the principles of its arrangement being based on those of the United States Temporary Military Hospitals erected during the late war, which were afterwards extensively adopted in Germany during the Franco-German war, and also to a greater or less extent in some of the later European constructions. This building consists of only one story, and is comprised in a rectangular space of 38 x 143 feet, its position lengthwise being nearly north and south. It contains at the south end a sitting-room 30 x 16 feet, communicating directly with a ward-room 30 x 88 feet, the latter having a capacity of 28 beds. From the north end of the ward-room a hall 6 feet in width connects with an entrance from the street at the north end of the building. On the west side of this hall are the operating-room, 11½ x 16 feet, and the nurses' room, 11½ x 14 feet, the latter having a linen-closet 11½ x 6 feet attached to it. On the east side are the baths, lavatories, water-closets, and a special diet kitchen 11½ x 10 feet. The foundations of the building are stone, and the walls above are brick, built with an air space in the brick-work. The floor is raised five feet above the ground, and the space underneath is left open for the free circulation of air through arched openings in the brick walls along the sides of the building, the area of the ground within being covered with good asphalt pavement, to prevent moisture arising from it. The arrangements made for free ventilation are very complete, the ward having ridge ventilation in addition to that from other sources. The windows are glazed double, and the building is heated by a hot-water circulating apparatus. This ward is shown in the centre of the group in our picture.

In 1877 a women's surgical pavilion ward, as shown in the foreground of the picture, was erected, having the same general principles of design as the former ward, but being more elaborate in character of finish, and having some improvements which experience with the other ward suggested. The building is of fine pressed brick, ornamented with belt courses of black bricks and encaustic tiles, and with Ohio sandstone and green serpentine stone trimmings around the doors and windows. It is one story in height, with a basement at each end, and an open space beneath the ward. It covers an area of 147 x 33 feet, and at the rear end is a fine porch (facing the south) for use of patients. The ward-room is in the centre of the building, being 94 x 30 feet area, and accommodating 28 beds. At the south end is a large sitting-room, with special diet kitchen in the basement underneath. At the north end are the operating-rooms, water-closets, baths, linen-closets, etc. All the recent improvements and appliances for hospitals have been introduced, and the finish throughout is of the most approved kind for its purpose.

The building is heated by indirect steam radiation, and the foul air is drawn off through registers under each bed into an ample ventilating shaft, 50 feet in height, through which a constant draft is maintained by heating, if necessary. The walls of the building are double, the windows double glazed, and the ward proper has ridge ventilation. In 1883 a women's medical ward was built on almost the same plans as the ward first described, and which had proved such a success. This last ward is shown in the background of our picture.

PHOTO-GELLOTYPE WELLS & HOPE CO. PHILADELPHIA

PRESBYTERIAN HOSPITAL—39th STREET AND POWELTON AVENUE, PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

The State Industrial Reformatory, at Huntingdon, Pa.

In 1878 the Legislature of Pennsylvania authorized the construction of a penitentiary for the Middle District of Pennsylvania, and a commission was appointed to select a site and construct the institution. An exhaustive examination was made of all the sites offered within the district, which resulted in the selection of a location near Huntingdon, Pa.

The general plan having been agreed upon, the foundations of the main enclosure walls were built; but in 1881 the Legislature passed an act changing the institution from a penitentiary to a reformatory, which made necessary considerable modification in the plans of the buildings.

Under successive appropriations there have been constructed the central guard-room, two ward buildings, dining building, and the kitchen and laundry building. The construction of the remaining buildings will be prosecuted during the coming season.

The main wall encloses a space 680 x 680 feet square, containing $10\frac{6}{10}$ acres.

The administration building is located in the centre of the front, just outside of the walls, and includes the entrance gateway. After entering the enclosure a visitor passes directly into the centre building, which, on the ground-floor, contains a large open room with bathing pool in the middle. On the next, or main floor, is a guard-room which commands a view of all the wards. Above the guard-room is a chapel or general assembly room.

There are four wards radiating from the central building. The wards contain the cells, which are in three tiers, and which are generally 8 x 9 feet, and 8 feet 4 inches high. The total number of cells in the four wards is 744.

Adjacent to each ward is a building three stories high, containing school-rooms.

In the rear of the central building, and connected with it by a two-story corridor, is the dining building, the first floor of which contains the dining-rooms, the second floor being utilized for sleeping apartments for the employees. Back of the dining-room is a building containing kitchen, laundry, etc.

The system adopted for the reformatory is the "congregate" system. The inmates, who are supposed to be all *first offenders*, are to be graded into three classes, and be promoted from a lower to a higher class, according to merit and good behavior. The cells are to be used only for sleeping-rooms; the school-rooms are for the instruction of the various classes, and in the rear of the prison buildings there will be workshops, in which the inmates will be taught useful trades. The Legislature has not yet passed the necessary laws for the government of the institution, but it is the intention to make it a reformatory for young offenders, rather than a prison for the punishment of confirmed criminals, and it is expected that inmates will, by good behavior, be allowed to earn conditional liberty, reporting at regular intervals to the proper authorities, and liable to an immediate return to the institution for any failure to properly conduct themselves.

The foundations of outer walls and buildings are stone.

The work above ground is of brick. All floors are artificial stone over brick arches. The stairways and galleries are iron. The cells are entirely of brick masonry, with cement floors and iron-grating doors. Everything about the buildings is made strictly fire-proof. Water supply is had from a reservoir about half a mile distant, supplied by natural springs. The Juniata River, which flows parallel with the main front of the reformatory, and about 400 feet distance, with a fall from the grounds to the river of about 25 feet, affords ample opportunity for thorough drainage.

Every precaution has been taken to ensure good ventilation and to meet the most rigid sanitary requirements. The buildings will be heated throughout by steam furnished from the boiler-house in rear of the kitchen building, and an engine located in the same building will drive the machinery in the workshops.

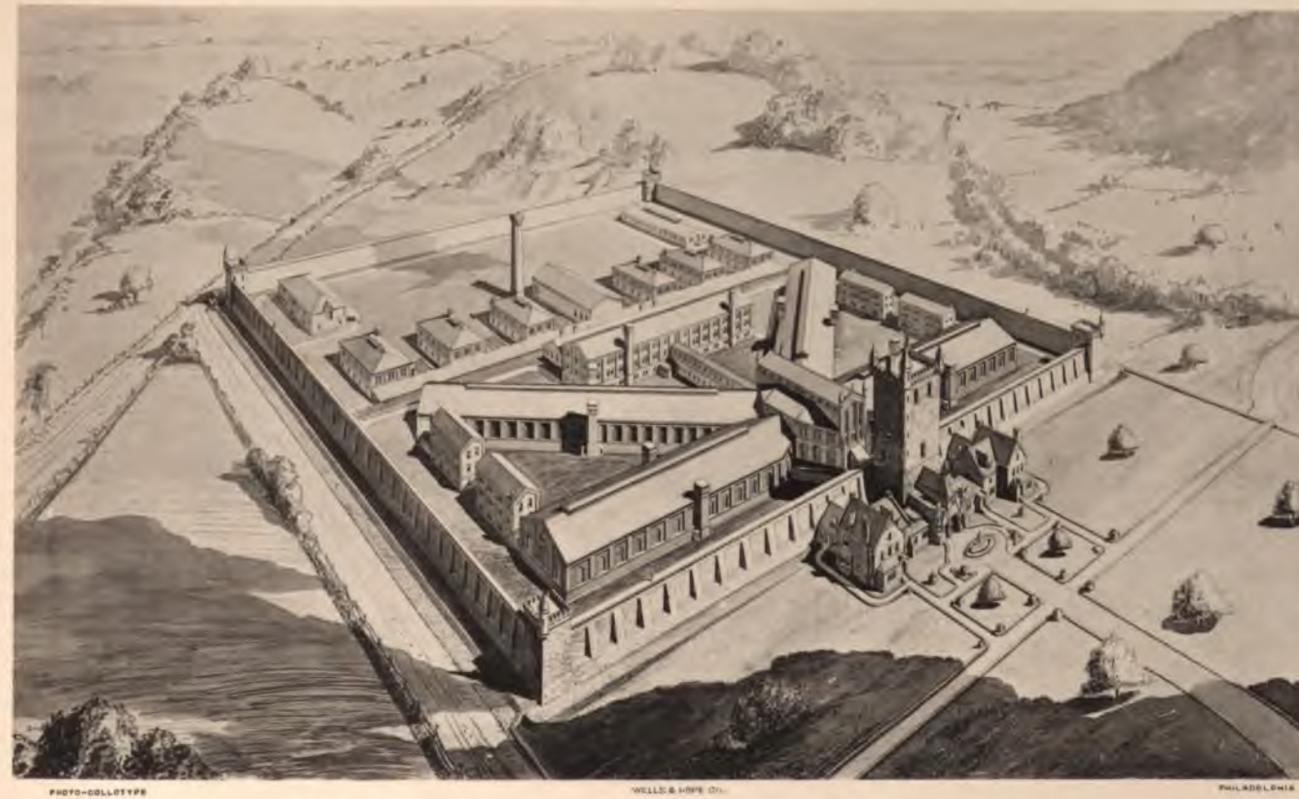


PHOTO-COLLOTYPE

WELLS & HOPE CO.

PHILADELPHIA

STATE INDUSTRIAL REFORMATORY, HUNTINGDON, PENNSYLVANIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

PHOTO-COLLOTYPE WELLS & HOPE CO. PHILADELPHIA

STORE, 26 SOUTH 7th ST., PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

STORE BUILDING, Nos. 1222-4-6 ARCH STREET, PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, Pa.

PHOTO-CELLOTYPE WELLS & HOPE CO. PHILADELPHIA

STORE BUILDING, Nos. 121-123 MARKET STREET, PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

PHOTO-COLLOTYPE WELLS & HOPE CO. PHILADELPHIA

BANKING HOUSE OF DREXEL & CO., CORNER 5th AND CHESTNUT STREETS, PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

Franklin Institute Electrical Exhibition Building, Philadelphia.

The building for the Electrical Exhibition of 1884 by the Franklin Institute being a temporary structure, was erected in the most economical manner; but at the same time an attempt was made to give it an attractive appearance by breaking the outline, or rather the sky-line, as much as was consistent with a due regard for economical construction and a convenient division of the interior space. The dimensions are 312 feet on Lancaster Avenue, 160 feet on Thirty-third Street, 283 feet on Foster Street, and 292 feet on Thirty-second Street; an irregular quadrilateral, with two right angles, Lancaster Avenue being the diagonal street. This space was divided first into a parallelogram 160 x 283 feet, extending from Thirty-second to Thirty-third Street, and the full width of the frontage on the latter street. Through the centre of this parallelogram extends what might be called the nave (to borrow a term from ecclesiastical architecture), covered by an arched roof, the trusses of 100 feet span springing from the ground, and meeting in the centre at a height of 65 feet. On each side of this runs a side passage 30 feet wide, each end of which terminates in a tower 30 feet square. The 30 feet passages are carried across the ends of the nave, between the towers, two stories high; and at the second floor level a gallery extends along each side of the nave, inside the curved trusses, connecting the second floor at the opposite end and completing the circuit of this part of the building. The triangular area remaining is covered by roofs of 30 feet span, with a tower at the corner of Thirty-second Street and Lancaster Avenue, hexagonal on plan, to suit the angle formed by the streets.

The effect of the exterior is not unpleasing, as may be seen from the illustration, while the interior view through the arched nave, when filled with exhibits and brilliantly illuminated by electric lights, with its fountain playing, and the throngs of people moving about, presented quite an attractive picture. We are indebted to the Franklin Institute for the engraving on this page.

INTERIOR VIEW.

PHOTO-COLLOTYPE WELLS & HOPE CO. PHILADELPHIA

FRANKLIN INSTITUTE ELECTRICAL EXHIBITION BUILDING, LANCASTER AVENUE AND 32d STREET, PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, Pa.

MARKET HOUSE AT DEMARARA, SOUTH AMERICA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

PHOTO-COLLOTYPE WELLS & HOPE CO. PHILADELPHIA

MARKET HOUSE AT DEMARARA, SOUTH AMERICA, SHOWING IRON WORK IN PROGRESS OF ERECTION.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, P

SEA SIDE MEMORIAL CHAPEL, BEACH HAVEN, NEW JERSEY.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

SAINT ANDREWS P. E. CHURCH, 36th AND BARING STREETS, PHILADELPHIA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

BRYN MAWR HOTEL, BRYN MAWR, PENN'A.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, Pa.

Mountain House, Cresson.

This hotel is situated on the summit of the Alleghany Mountains, 2200 feet above the sea, near the main line of the Pennsylvania Railroad, and 15 miles west of Altoona.

The style of architecture is such as to please the eye, and at the same time work in harmony with the most modern hotel requirements.

The main building presents a frontage of nearly 300 feet, broken at the centre and ends by projections, those at the ends being flanked by circular towers which rise to a height of 100 feet. The structure is "U" form in plan, the end projections extending 220 feet to the rear, and the whole is surrounded by a piazza 16 feet in width, affording an extensive promenade. There are four floors and a basement, the latter constructed of stone, and the portion above of timber. The upper part of the exterior is finished with California redwood shingles, which add to the architectural effect. The basement affords ample space for children's play-rooms, billiard-room, barber-shop, and other offices. The main floor has a grand parlor 91 x 43 feet, two smaller parlors, a dining-room 220 x 43 feet, an office, reading-room, etc.; but the great feature on this floor is the "Social Hall," a room opening out from the main hall, octagonal in form (like an immense bay), 44 x 30 feet, and furnished with a large, old-fashioned fireplace in addition to the fireplace in the hall, thus adding much to the cheerful and home-like comfort of the house.

The bedrooms are large and airy, providing accommodations for over 500 guests without crowding, and on each floor there are ample bathing and other facilities. Cottages near the hotel accommodate 300 additional guests, all of whom take their meals at the hotel.

Wide, easy stairways communicate with the different floors, so arranged in the ends of the corridors as to ensure safe exit in case of fire. There is also an elevator to all of the stories, provided with an Ellithorpe safety air-brake.

The kitchen and laundry departments are in a two-story fire-proof building, entirely separate from, but adjacent to and connected with, the main house, and there is also a separate building for children's dining-room, connected by porch corridors with the main building. Underneath the children's dining-room is the bowling-alley.

The building is lighted with gas and warmed by steam. Water is pumped from natural springs of remarkable purity into an elevated reservoir which commands the whole building, and from which it is distributed throughout the house.

MOUNTAIN HOUSE, CRESSON SPRINGS, PENNA.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, Pa.

The Sagamore Hotel.

The Sagamore Hotel is situated on a high point of Green Island, Lake George, N. Y., in the best possible position to obtain the cool summer winds across the water, and secure a lovely view of the lake and the surrounding mountains. The design of the building may be said to be unique in the fact that all the rooms are *front rooms*, delightful views being had in all directions. Being located on a hill-side, advantage has been taken of this to arrange the various floors to suit the slope, and the first, second, and third floors in reality all become ground-floors, exit being had from some part of each one directly to the grounds without the use of stairways. This feature gives a charming variety to the interior arrangement, which has been remarked and appreciated by all those who visit the hotel. There are large and airy rooms for about 300 guests, and in many of the rooms there are open fireplaces.

Electric bells are provided, and the house is lighted throughout with the Edison incandescent electric light. A hydraulic elevator communicates with all floors. Ample water and bathing facilities are provided, the water being brought from a famous mountain spring two miles distant. The sanitary arrangements throughout are very complete, the sewage being disposed of by a thorough system of subsoil drainage on favorable ground some distance from the building.

Green Island, about seventy acres in extent, is well wooded, and is laid out in walks and drives; a handsome rustic bridge connects it with the main land on the west side.

The whole of the work, including bridge, steamboat landing, dock for row-boats, etc., has been carried out from our designs and under our direction.

PHOTO-GELATYPE WELLS & HOPE CO. PHILADELPHIA

SAGAMORE HOTEL, GREEN ISLAND, LAKE GEORGE, N. Y.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

Astronomical Observatory, West Point, N. Y.

Passengers by the New York, West Shore and Buffalo Railroad, along the Hudson River, will notice that the train passes through a tunnel under the rocky headland on which stands the United States Military Academy at West Point. When the tunnel was projected it was well understood, both by the government and the railroad company, that the vibration caused by passing trains would be sufficient to destroy the accuracy of the delicate instruments employed in the Astronomical Observatory, and this was provided for by the construction of a new building located on higher ground, and far enough from the railroad to be entirely free from vibration. Its dome can be seen from the river, overtopping the trees on the western bank, about half a mile southwest of the other buildings, and nearly the same distance southeast of old Fort Putnam.

The building consists of a central apartment, around which are grouped four wings in the shape of a Greek cross, their axes coinciding with the cardinal points of the compass. The central part measures 31 feet square out to out, and each of the three wings projecting east, west, and south is 27 feet long by 20 feet wide, the outer end having a half octagonal termination. The north wing differs from the others, terminating in a parallelogram 20 x 36 feet, with axis east and west, the extreme projection from central part being 44 feet 6 inches. The building thus measures 85 feet from east to west by 102 feet 6 inches north and south. The central part is two stories high, the upper story being covered by a dome constructed of paper with wooden ribs, such as are used in the construction of the racing "shells" now so much used by boat clubs, and contains the great "equatorial" telescope. The dome has a slit down one side from apex to base, and is arranged to revolve on a track on top of the walls, so as to bring the openings in any desired position. Some novel and ingenious mechanism is displayed in the construction of the rolling gear and also the shutter which closes the opening.

The square plan of the central apartment is brought to a circular shape above to receive the revolving dome by a vault of concrete springing from the second floor level. Just below the top of the circular wall and above the roofs of the wing buildings a balcony of granite with ornamental iron railing extends all around the exterior of the central apartment. Another balcony (of iron) runs around the inside, level with the top of the wall, where the track for revolving the dome is set. The lower story in the central part serves as a hall to give access to the other apartments which open out of it, the entrance door being at the southeast angle. Through this room rises the pier which supports the telescope in the dome. It is a frustum of a cone, 12 feet in diameter at the base, and 6 feet at the top, and is built of concrete, as are all the foundations for the other instruments.

The apartment on the east is called the "Transit" room, and that on the south the "Prime vertical" room, from the names of the instruments used in them. Both of these rooms have windows in the sides extending up to top of walls, where they connect with an opening carried across the roof, so as to allow the instrument to be swung through an arc of 180 degrees vertically.

The west wing contains workshops in the first story and basement. The north wing contains rooms for the use of officers on duty at the observatory, and a hall, in which there is a stairway to the upper story.

The construction of the building is substantial, and as nearly fireproof as the avoidance of combustible materials can make it. The general effect is of solidity and permanence, and not without a simple dignity befitting a government building.

PHOTO-COLLOTYPE WELLS & HOPE CO. PHILADELPHIA

ASTRONOMICAL OBSERVATORY, UNITED STATES MILITARY ACADEMY, WEST POINT, N. Y.

WILSON BROTHERS & CO.
Civil Engineers and Architects,
PHILADELPHIA, PA.

The Norman Williams Public Library, at Woodstock, Vt.

PART OF ENTRANCE PORCH.

The Norman Williams Public Library, at Woodstock, Vt., was erected and endowed as a perpetual memorial of the late Norman Williams and Mary Ann Wentworth Williams, his wife, by their son, Dr. Edward H. Williams, and its entire use is permanently dedicated to the people of the town of Woodstock and of the towns in the immediate vicinity, also to strangers visiting the town, under proper and necessary restrictions, but free of all charge and expense.

The architectural style selected for the building was suggested by the name "Norman," and has been carried out as consistently as a due regard for modern requirements and refinement would permit. The principal materials employed in the construction of the work are native to the State of Vermont. Gray Barre granite has been used for the base, steps, doorsills, etc., and the same material, polished, forms the shafts of the columns in the front arcade. The other cut-stone work is gray Isle La Motte limestone, and all the walls are faced with red Burlington stone, laid as broken range work, the stones being squared, but of varying sizes. At the base of the front gable over the entrance, in antique Roman letters, is the inscription, "The Norman Williams Public Library," and some courses above it is the date, "Anno Domini MDCCCLXXXIII."

The roof is covered with slate, and the ridge cresting is terra-cotta. The chimneys are of red stone capped with richly-carved gray stone.

The plan of the building is simple, the general outline being "T" shaped, with the entrance in the centre of the head of the letter through an arcade which encloses a recessed porch. This porch has walls of finely-cut Isle La Motte stone, marble-tiled floor, and a heavily-panelled wooden ceiling. On either side of the door, on the walls of the porch, are bronze

tablets. The tablet on the left bears the following inscription: "In loving memory of NORMAN WILLIAMS and MARY ANN WENTWORTH WILLIAMS, his wife, this building is erected by their son, Edward Higginson Williams." The tablet on the right contains two bronze medallions in bas-relief, life-size, of Mr. and Mrs. Williams.

On the right of the entrance, opening on a cross hall 8 feet wide, is the reading-room, 18 x 27 feet floor area and 13½ feet in height. It has a panelled dado and ceiling, and a large fireplace, with mantel executed in light red terra-cotta. The walls of this room above the dado are lined with Linerusta-Walton and shaded with colored bronzes.

On the left, corresponding with the reading-room, are located the reference-room and the librarian's office, each 18 x 13½ feet floor area, and of the same height as the reading-room. The style of finish corresponds with that of the reading-room, except that the walls are plastered and painted a salmon color. There is a terra-cotta mantel of small dimensions, with open fireplace, in the corner of each room.

The Library, or book-room, occupies an extension at the rear, and is a handsome apartment 54½ x 25½ feet, lighted from both sides by windows arranged in groups of three, and placed between the piers supporting the curved roof-trusses which span the room. The roof-trusses are 11 feet apart between centres, and are exposed to view up to the collar-beam, giving a clear height of 24½ feet. The book-cases are arranged with their ends to the walls, two to each bay. Each case is 8 feet long by 2½ feet deep and 8 feet high, leaving a space of 3 feet between opposite faces. The windows are placed above the floor high enough to clear the tops of the cases, which therefore do not obstruct the light. The walls between the book-cases, and elsewhere around the room, are lined to the height of the window-sills (8 feet) with variegated Vermont marbles polished; above that the walls and ceiling between the rafters are plastered with a sand finish. The ceiling is divided into panels by moulded wooden ribs, and walls and ceilings are painted on the plaster a pale apple-green color.

All the interior work is Georgia pine, finished to show its natural warm color. The windows are glazed with plate-glass, and have special winter sashes to go on outside. One window in the rear gable has stained glass. The building is lighted by gas and heated by steam. The gas fixtures are a great feature in the ornamentation of the building, being made in rare taste from special designs. They are in old gold color, very massive, and of antique form.

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NORMAN WILLIAMS MEMORIAL LIBRARY BUILDING, WOODSTOCK, VERMONT.

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